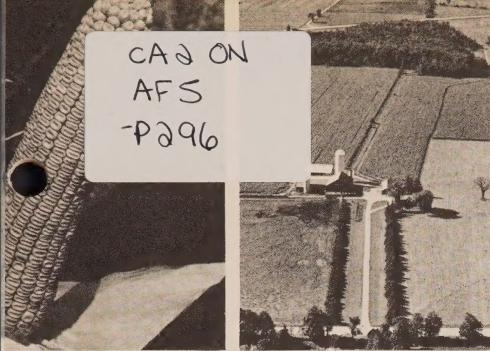
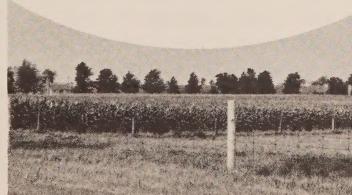


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**1971**  
**FIELD CROP**  
**RECOMMENDATIONS**



ONTARIO  
DEPARTMENT OF **AGRICULTURE & FOOD**  
PARLIAMENT BUILDINGS, TORONTO

VERETT BIGGS/DEPUTY MINISTER

HON. WM. A. STEWART/MINISTER



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Under regulations of the Pesticides Act, administered by the Ontario Department of Health, **no one may use aldrin, DDD (TDE), dieldrin, and heptachlor** to control insects on crops. DDT may not be used, except by special permit. For further information consult the Soils and Crops Specialist in your area, or Pesticides Control Section, Environmental Health Services Branch, Ontario Department of Health, 1 St. Clair Avenue West, Toronto 195, Ontario (telephone 416-365-2401).



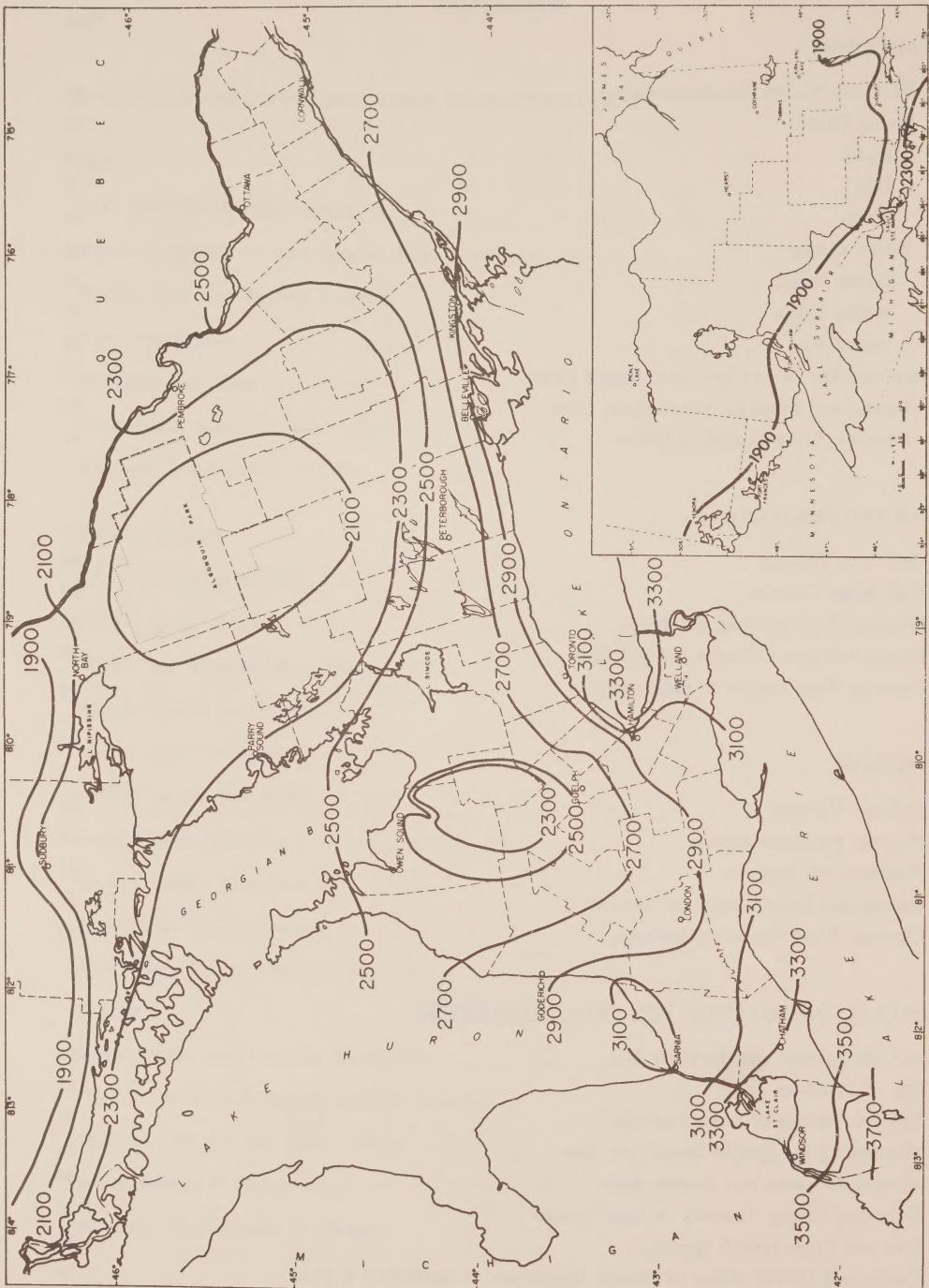
Space limitations in this booklet restrict the amount of detail which can be included in each recommendation. Where commercial products are recommended, this detail is provided, by law, on the container label. Read and follow the directions, conditions, and limitations described on such labels. This is the only way to make effective, safe use of such products (see also Pages 54 and 55). Additional information on other practices recommended here can be obtained from the local office of the Ontario Department of Agriculture and Food. (See Pages 58 and 59.)

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## HEAT UNITS AVAILABLE FOR CORN PRODUCTION



CORN

## 1971 Recommended Hybrids

Corn hybrids suitable to Ontario conditions are arranged here in order of maturity from short- to long-season types. Company name and number are both needed to identify each hybrid.

The rating on the left indicates the number of heat units required to mature the hybrids. The heat unit requirement for each hybrid can vary slightly (50 to 75 heat units) from year to year and therefore, the order of maturity may change as more information is obtained on each hybrid. The heat unit rating refers to some hybrids above and below as well as opposite the number.

| Heat Unit Rating | Hybrid          | Heat Unit Rating | Hybrid          | Heat Unit Rating | Hybrid             |
|------------------|-----------------|------------------|-----------------|------------------|--------------------|
| 2                | United 106      | SC               | Co-op 270       | DC               | Asgrow United      |
| 6                | Warwick SL209   | SC               | Co-op 277       | DC               | A. T. C. 39        |
| 0                | DeKalb 007      | DC               | Pride 137       | DC               | 3W Haapala H81     |
| 0                | United 108      | SC               | Michigan 275-2X | SC               | N. K. PX519        |
| 0                | Stewarts 2301   | SC               | United 127A     | SC               | N. K. PX525        |
| 0                | Stewarts 2605   | SC               | DeKalb 45       | DC               | 3W Belle River 350 |
| 2                | Pioneer 3972    | 3W               | Seneca 285      | 3W               | Co-op S327         |
| 9                | Pride 116       | DC               | N. K. PX446     | 3W               | Pioneer 3579       |
| 0                | N. K. KE 410    | DC               | N.K. PX20       | SC               | DeKalb XL316       |
| 0                | P. A. G. SX42   | SC               | Funk's G 4110   | SC               | Pride R290         |
| 0                | United 4        | DC               | Funk's G 4180   | 3W               | Warwick TX60       |
| 0                | Warwick 261     | DC               | Pioneer 3909    | SC               | P. A. G. SX76      |
| 0                | DeKalb XL301    | 3W               | Pride R221      | 3W               | Acco U333          |
| 0                | Funk's G4082    | 3W               | Co-op S280      | OC               | Belle River 801    |
| 0                | Warwick TX21    | 3W               | N.K. PX476      | 3W               | Pride R501         |
| 0                | Stewarts 2704   | SC               | Renk R98        | DC               | Pioneer 3667       |
| 0                | Stewarts 2606   | SC               | Jacques JX902   | SC               | Acco UC3300        |
| 0                | Pioneer 3889    | DC               | Jacques JX952   | SC               | Funk's G4444       |
| 0                | Pioneer 3873    | DC               | Jacques 951 J   | DC               | Warwick SL510      |
| 0                | Warwick 214     | DC               | P.A.G. 34       | 3W               | N.K. PX47          |
| 0                | P. A. G. SX47   | SC               | Pride 280       | DC               | United 134         |
| 2                | Pride 110       | DC               | Seneca XX316    | 3W               | United 132         |
| 7                | Seneca XX155    | 3W               | Warwick 316     | DC               | Todd M30           |
| 0                | Stewarts 3710   | 3W               | Warwick 401     | DC               | Jacques JX222      |
| 0                | Funk's G43      | DC               | Warwick SL415   | SC               | Jacques JX1052     |
| 0                | Belle River 889 | DC               | Warwick 405     | DC               | Co-op 338          |
| 0                | United 111      | SC               | Pioneer 3911    | SC               | Co-op S345         |
| 0                | Funk's G5145    | DC               | Pioneer 3814    | DC               | Warwick TX66       |
| 0                | Funk's G5150    | DC               | Pioneer 3675    | DC               | N.K. PX545         |
| 0                | DeKalb XL11     | SC               | Acco UC1900     | SC               | Funk's G4360       |
| 0                | Pride 119       | DC               | DeKalb XL15A    | SC               | Renk RK44          |
| 0                | Pride R129      | 3W               | Seneca XR22     | SC               | DeKalb XL45        |
| 0                | Warwick 292     | DC               | Warwick SL416   | SC               | DeKalb XL45A       |
| 0                | DeKalb XL304    | 3W               | Pioneer 385     | DC               | P.A.G. SX69        |
| 0                | Stewarts 4711   | DC               | Seneca 318      | 3W               | United 1XL5        |
| 0                | United 7        | DC               | Belle River 251 | SC               | Pride R450         |
| 2                | Pioneer 3959    | 3W               | DeKalb XL24     | SC               | N.K. PX50          |
| 8                | Pioneer 3853    | DC               | Belle River 295 | SC               | Todd M55           |
| 0                | N. K. PX442     | 3W               | Jacques 1004E   | DC               | P.A.G. SX52        |
| 0                | P. A. G. SX48   | SC               | Pioneer 3773    | SC               | Funk's G4384       |
| 0                | P. A. G. 25     | DC               | Pride R381      | 3W               | Warwick TX71       |
| 0                | P.A.G. 22       | DC               | Co-op 297       | DC               | Tomco UC 4400      |
| 0                | Jacques JX22    | SC               | Funk's G4252    | 3W               | United IXL6        |
| 0                | Pioneer 3956    | SC               | United 128      | SC               | SC                 |

*DC*—Double Cross

DC—Double Cross  
SC—Single Cross

3W—Three-Way Cross

*OC*—Other Crosses (Modified Single, Modified 3-Way)

**NOTE** — Refer to Page 10 for more information about LEAF BLIGHTS before selecting hybrids.

## Choosing Hybrids For Your Farm By Heat Units

Locate the vicinity of your farm on the map on Page 6 and estimate the heat unit rating for your farm. If you plant corn BEFORE mid-May, choose a hybrid from among those on the recommended list having equal or LOWER rating than your farm.

If soil conditions or any other factor on your farm usually DELAYS planting later than mid-May, then for a DELAY of one week or more, DEDUCT 100 heat units for EACH week from the rating for your farm and select hybrids from the list having that rating, or a LOWER rating.

## Seeding Date and Planting Depth

Optimum seeding date centers on May 7 in southwestern Ontario, and May 10 in central and eastern Ontario. Those seeding earlier commonly must contend with lower soil and air temperatures. Studies show there is a relationship between emergence, temperature, and depth of seeding. The early seeding should be sown shallow ( $1\frac{1}{2}$  to 2 inches at

a maximum). If they are sown deeper a delay and reduction in emergence can occur. The result is an uneven stand. For later seedings (temperature is warmer) there may be a slight slowing of emergence for deeper plantings but the reduction in stand likely will be small.

## Plant Populations

In standard row widths of 36, 38, and 40 inches, a population of 18,000 plants per acre is recommended. It probably should be reduced somewhat in areas of frequent drought, where fertility is low, or under late-planting conditions. A higher population is probably warranted where maximum yield is being sought, assuming moisture is adequate, fertility is high, and planting is early.

### Inches Between Seeds to Achieve Specified Populations

| EXPECTED PLANTS PER ACRE | REQUIRED SEED PER ACRE<br>(ASSUME 85% STAND) | ROW WIDTH |     |     |     |     |     |
|--------------------------|--|-----------|-----|-----|-----|-----|-----|
|                          |  | 28        | 30  | 32  | 36  | 38  | 40  |
| 18,000                   | 21,200                                       | 10.5      | 9.8 | 9.1 | 8.2 | 7.8 | 7.4 |
| 20,000                   | 23,500                                       | 9.5       | 8.9 | 8.2 | 7.4 | 7.0 | 6.7 |
| 22,000                   | 25,900                                       | 8.6       | 8.1 | 7.6 | 6.7 | 6.4 | 6.1 |
| 24,000                   | 27,600                                       | 8.1       | 7.6 | 7.1 | 6.3 | 5.9 | 5.6 |

## Fertilizers for Corn

Fertilizer needs of the corn crop should be determined from a soil test. The following general fertilizer recommendations should be followed only when a soil test report is not available.

■ On sandy or loamy soils use 100 lb N, 60 lb P<sub>2</sub>O<sub>5</sub> and 60 lb K<sub>2</sub>O per acre, e.g. 6-24-24 (a 1-4-4 ratio), at 250 lb per acre, plus 85 lb additional N.

■ On clay soils use 100 lb N, 60 lb P<sub>2</sub>O<sub>5</sub> and 30 lb K<sub>2</sub>O per acre, e.g. 8-32-16 (a 1-4-2 ratio) at 200 lb per acre, plus 85 lb additional N.

■ If well-manured, reduce the total fertilizer application by one-quarter. Following a legume sod, only the nitrogen can be reduced to a total of 50 lb per acre. If manured and following a legume sod, additional N will not be required.

## Methods of Fertilizer Application

The nitrogen should be applied in the spring with the major portion either as a preplant application (broadcast on the surface and worked in, plowed down, injected) or side dressed before the corn is 12 inches high. Fall application of nitrogen is not as effective as application in the spring; therefore, only spring application is recommended.

The major portion of the phosphorus and potassium may be broadcast and worked into the soil either in the fall or spring. If applied in the spring, the nitrogen, phosphorus, and potassium may be applied in one operation by using a mixed fertilizer.

However, a fertilizer containing nitrogen and phosphorus or nitrogen, phosphorus, and potassium should be applied as a starter at planting time. This can be done in one of two ways:

(A) Apply the starter fertilizer as a band 2 inches to the side and 2 inches below the seed. The rate of application should not exceed 50 lb of nitrogen or 80 lb of nitrogen and potash per acre in 38-inch rows. Not more than 25 lb of urea nitrogen should be applied in this position.

To Calculate Nitrogen and Potash Content: Examples

250 lb of 6-24-24 per acre provides 75 lb of nitrogen and potash

200 lb of 8-32-16 provides 48 lb of nitrogen and potash

OR

(B) Apply the starter fertilizer in the row with the seed. The rate of fertilizer with the seed should not exceed 6 lb of nitrogen and potash in 38-inch rows. Neither urea nor diammonium phosphate (18-46-0) should be applied in contact with the seed of corn.

To Calculate Nitrogen and Potash Content: Examples

40 lb of 5-20-10 per acre provides 6 lb of nitrogen and potash

50 lb of 8-25-3 per acre provides 5½ lb of nitrogen and potash

NOTE: Regardless of whether method A or B is used, the rate of applying the starter fertilizer can be increased if the rows are narrowed, provided that the concentration in the row does not exceed that specified for 38-inch rows.

CORN

## Disease And Insect Control In Corn

(See also Pages 54 to 55)

**SEED TREATMENT** — Commercial corn seed sold in Ontario has been treated with a fungicide, such as thiram or captan, for protection against **SEED DECAY** organisms. Some seed has been treated also to control stored-seed insects. All seed should be treated further by the grower. Use the planter- or drill-box method. Use diazinon to reduce damage by **SEED MAGGOTS** and lindane for protection from **WIREWORMS**. Seed treat-

ment combinations of diazinon and lindane should be used every year and these are available from seed suppliers in individual containers for 1 bu lots of seed. Follow the directions on the label with care.

Wear rubber gloves and use a wooden paddle for mixing the chemicals with the seed. Do not inhale dust stirred up during mixing. Thorough mixing is important.



Wireworms attack untreated seed.



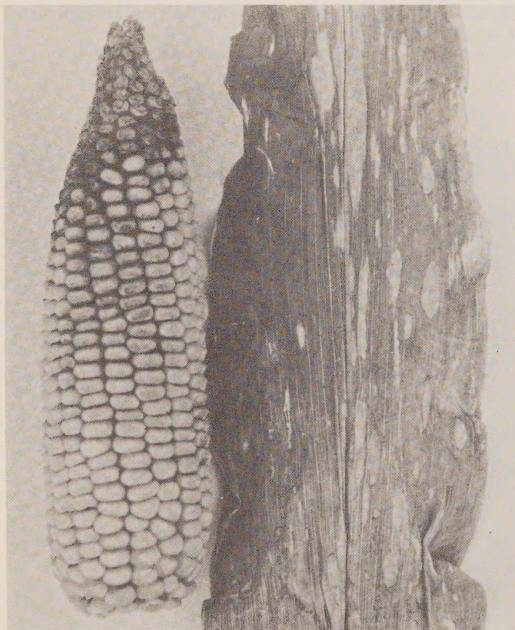
Corn field heavily damaged by wireworm.

## DISEASES

### SOUTHERN LEAF BLIGHT and YELLOW LEAF BLIGHT.

Damage can be reduced by:

1. Plowing under old cornstalks and leaves to help kill overwintering disease-fungi.
2. Rotating corn with other crops to help prevent disease buildup.
3. Minimizing plant stresses by
  - (a) keeping plant populations below 22,000 per acre, and
  - (b) maintaining high soil fertility and good soil structure. Avoid poorly-drained land.
4. Planting hybrids or blends of resistant with susceptible hybrids. Hybrids from seed produced on detasseled plants having "normal" makeup (or "N" cytoplasm) are resistant to the blights. Hybrids from seed produced on Texas male-sterile plants (with "T" cytoplasm) are susceptible to the blights. Seed corn for sale for the 1971 season will be tagged N (normal), T (Texas male-sterile), or B (blend of N with T). Although it is not possible to predict how severe leaf blight will be in 1971, the disease is not expected to become serious in Ontario.



Southern leaf blight on leaves and grain

**STALK ROT.** Harvest as early as possible because stalk rot develops mostly on mature plants and becomes a greater problem the longer the crop is left in the field. Stalk rot is often serious in fields with high plant populations, low fertility, and poor soil conditions. Grow hybrids with low stalk breakage counts, as listed in the 1971 Ontario Hybrid Corn Performance Trials. Copies are available from your county Agricultural Representative.

## INSECTS

**CORN ROOTWORM.** Where corn is grown continuously, this insect tends to increase in numbers. The present distribution and relative abundance are shown below. Within each region delineated on the map there may be pockets where the infestations are greater than in the region as a whole.

Before considering a control measure, corn growers should establish the levels of rootworm infestation in EACH field by

### 1. DETERMINING LARVAL (WORM) PRESENCE.

About the second week of July when larval size and population are usually optimum, dig 10 or more plants at random from all parts of the field. Place each plant on a 3-foot-square piece of black plastic. Shake all soil from the roots and break up the clods. Roll the soil slowly by lifting one side of the sheet and watch for the worms at the top edge of the soil; or use a stick to work small quantities of soil from one portion of the sheet to the other. Also split thick roots to check for worms and feeding. Make a worm count. **AN AVERAGE OF 10 OR MORE ROOTWORMS PER PLANT IS CONSIDERED TO BE A DAMAGING INFESTATION WARRANTING A CONTROL MEASURE THE FOLLOWING YEAR.**



Normal root system (left) and a root system severely damaged by feeding of northern corn rootworm larva.

**2. DETERMINING THE EXTENT OF GOOSE-NECKING AND ROOT DAMAGE.** Heavily infested plants are usually bowed or bent and can easily be pulled up because of a greatly reduced root system. Such plants often lodge after heavy rains accompanied by wind. Check for feeding damage to roots to verify that the lodging is due to rootworm. **FIELDS WITH 10% ELBOWED OR GOOSE-NECKED PLANTS INDICATE A NEED FOR CONTROL.**



**Goose-necked plants with reduced root systems are an indication of a high rootworm population.**

The corn rootworm feeds only on corn. **CROP ROTATION IS THE EASIEST AND MOST HIGHLY RECOMMENDED METHOD OF CONTROL.**

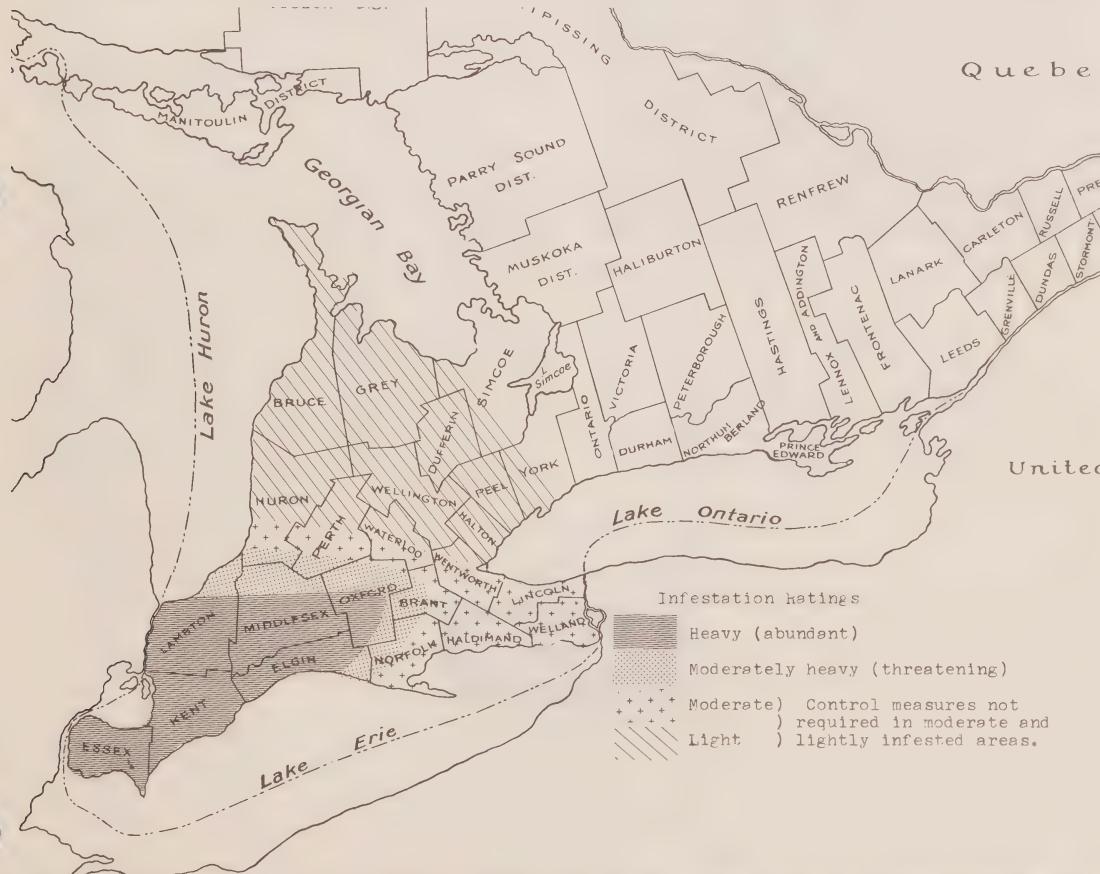
#### otherwise

Use any one of the following treatments (granular formations) in a 3- to 6-inch band, placed  $\frac{1}{2}$  to 1 inch above the seed and in front of the press wheel, but not in contact with the seed. **DO NOT USE AS A BROADCAST APPLICATION. USE THE LOWER RATES ON LIGHTER SOIL.**

|  |             |
|--|-------------|
| 1. Bux 10% granular                    | 7½ to 10 lb |
| 2.*Dyfonate 10% granular               | 7½ to 10 lb |
| 3.*disulfoton (Di-Syston) 15% granular | 4 to 7 lb   |
| 4. chlordane 25% granular              | 4 to 8 lb   |
| 5.*phorate (Thimet) 10% granular       | 5 to 10 lb  |

Pollination sometimes is reduced by rootworm adults feeding on silks but control is not usually practical.

\*These materials are deadly poisonous to the operator. Handle with care. Follow all safety directions stated on the label.



1970 distribution of the northern corn rootworm. Rootworm has not been found east of York County as indicated above.

**EUROPEAN CORN BORER.** There is some evidence that the European corn borer is increasing in importance as a pest of field corn. This is especially true where corn follows corn. There was a rather heavy infestation in 1970 but the amount of actual crop loss due to stalk breakage is hard to estimate since it varies greatly in different hybrids. Growers must be alert to possible economic loss from the pest.



Serious leaf feedings by corn borer. Treat plants BEFORE tassels show if 75% of the plants show damage.

The cream-colored female moth lays her eggs usually on the underside of corn leaves, beginning in early June in southwestern Ontario and somewhat later in other parts of the province. After hatching, the young borers feed on the leaves, giving them the appearance of having been pricked repeatedly by a pin. Sometimes the feeding scars are elongate. Later, the borers work downward into

the "throat" (whorl) of the plant and feed on the developing leaves. Afterwards, they enter the stalk. Control is effective only if the borers are destroyed before they enter the stalk.

You should examine the plants for borer feeding before tassels show in the whorl or when plants are about 2 feet high. If you find that more than 75% of the plants show feeding scars and if you are growing a hybrid that is susceptible to stalk breakage, treat with an insecticide at the per-acre rate given below:

Spray \*\*Carbaryl (Sevin) 50% WP 3 lb per acre  
or  
80 or 85% WP 1½ lb per acre

*\*\*Carbaryl is toxic to bees; do not use near clover fields in bloom, when corn is shedding pollen, or in the general area of apiaries.*

Be sure that the insecticide is applied into the whorl of the plant.

**NOTE:** Loss in grain corn is seldom high enough to warrant control. Two applications 7 to 10 days apart may be needed for significant control.

**CUTWORMS.** If climbing species attack the foliage of corn plants, SPRAY the seedlings in a 10-inch band in the row with carbaryl (Sevin) 50% wettable, 4 lb; or 80 to 85% wettable, 2½ lb.

**ARMYWORM.** Because grassy and weedy corn is attractive to armyworm moths for egg-laying, eliminate grasses and weeds from the corn crop. (See Ontario Department of Agriculture and Food Publication 75, **Guide to Chemical Weed Control.**) The result will be less armyworm damage to corn.

If armyworms move into corn fields, spray the border rows and adjacent cereals, pasture, or hay crops with carbaryl (Sevin), malathion or methoxychlor.

Read the warning about bees on Page 54 before spraying an in-bloom forage crop.

**CEREAL LEAF BEETLE.** Refer to section on "Grain Crops", Page 39, concerning movement of shelled and ear corn.



## CHEMICAL WEED CONTROL IN CORN

Always read and follow the instructions which the manufacturer has printed on the herbicide label. This will give you further information on how to apply the chemical and on conditions which will affect results. This can save you money and help prevent crop damage.

| Corn                  | Weed Situation  | Chemical                            | Active Ingredient      | Rate per Acre  | Remarks  |
|-----------------------|---|-------------------------------------|------------------------|--|--|
| Preplant-incorporated | Germinating weeds, annual grasses, including crabgrass, old witch grass, nut sedge, horse-tail. | Butylate (Sutan)<br>+<br>Atrazine   | 2 to 4 lb<br>+<br>1 lb | BUTYLATE (SUTAN) is a related chemical to EPTC (EPTAM) and is safer to use than EPTC on corn or light soils. This treatment is applied to a dry soil surface and incorporated within 10 minutes as specified for EPTC (EPTAM).<br><br>No delay in seeding is required when using SUTAN.  |  |
|                       |   | EPTC (EPTAM)<br>+<br>Atrazine       | 2 to 3 lb<br>+<br>1 lb | EPTC (EPTAM) has shown a considerable degree of safety on corn except on coarse, sandy soils. This treatment should be applied to a dry soil surface before planting and incorporated within 10 minutes with a double disk. A second incorporation at right angles with the disk in tandem with a harrow should be done as soon as possible. The 2-lb rate is used for annual grass control without delay in seeding. The 3-lb rate is needed for nut sedge control. A 7- to 10-day delay in seeding is suggested when using 3 lb (see label). |  |
|                       |   |                                     |                        | To obtain a much better overall weed control, 1 lb of ATRAZINE should be applied with EPTAM or SUTAN either as a tank mix or as a pre- or post-emergence spray.  |  |
| Preemergence          | Germinating weeds   | Atrazine                            |                        | 1½ to 2 lb   | The standard preemergence method of applying ATRAZINE is an effective treatment. This treatment level will not eradicate quack grass and is most likely to miss annual grasses, in particular crabgrass.   |
|                       |   | Atrazine<br>+<br>Alachlor (Lasso)   |                        | 1 lb<br>+<br>1 lb  | ATRAZINE plus ALACHLOR (LASSO) is a combination to which LASSO is specifically added because of excellent control of annual grasses for an 8- to 12-week period. Such a treatment should be considered where a buildup of annual grasses is evident.   |
|                       |   | Linuron<br>+<br>Propachlor (Ramrod) |                        | 1 to 1½ lb<br>+<br>2 to 3 lb   | Sold only as LONDAX, a commercial granular or wettable powder formulation. Provides both annual grass and seedling broadleaf weed control. RAMROD is generally a short-duration annual grass control. This treatment finds its most important use in band applications with subsequent row cultivation. RAMROD has given good results on muck and high organic matter soils. |

| Corn                       | Weed Situation  | Chemical                              | Rate per Acre<br>Active Ingredient | Remarks   |
|----------------------------|---|---------------------------------------|------------------------------------|---|
| Preemergence               | Germinating weeds   | Bladex                                | 2-3 lb                             | BLADEX controls most annual grasses and broad-leaved weeds with a good margin of safety. Barnyard grass and redroot pigweed are not adequately controlled. Quack grass is not controlled. Not recommended for heavy clay or muck soils. The low rates of 2 lb/acre should be used on coarse-textured soils. The addition of ATRAZINE will improve control of redroot pigweed and barnyard grass in particular.  |
|                            |   | Bladex<br>+<br>Atrazine               | 2 lb<br>+<br>1 lb                  |   |
| Postemergence              | Seedling weeds; broad-leaf weeds 2 to 4 inches; grasses at emergence              | Atrazine                              | 1½ to 2 lb                         | If ATRAZINE is applied before annual grasses reach the 3-leaf stage it provides a generally good to excellent weed control.   |
|                            | Seedling weeds; broad-leaf weeds 2 to 4 inches; annual grasses 1- to 3-leaf stage | Atrazine<br>+<br>Oil                  | 1 to 2 lb<br>+<br>1.5 gal          | The oil is a light mineral oil containing a suitable emulsifier. The oil is added to the spray tanks during filling at the rate of 1½ gal per acre. Add ATRAZINE to the water before adding the oil. Agitate the mixture while filling the tank.  |
|                            |   | Atrazine<br>+<br>Simazine<br>+<br>Oil | 1 lb<br>+<br>1 lb<br>+<br>1.5 gal  | <b>Do not use 2,4-D, 2,4-DB, MCPA or DICAMBA in conjunction with the oil-water emulsion method of applying ATRAZINE.</b> Annual grasses (foxtails, crabgrass, old witch grass, etc) should be sprayed before they reach the 3-leaf stage. This time of spraying should be based on stage of annual grass growth. Instances of early injury on corn have been reported following ATRAZINE in oil-water applications, especially during cold weather, but it may also occur under other conditions of stress such as hot, dry weather. The corn invariably has recovered. |
|                            | Many broadleaf annuals and perennials (control)                                   | 2,4-D (Amine)                         | 8 oz                               | Generally speaking the selective hormone chemicals have been replaced in corn production with selective residual weed killers. There still remain, however, a few weeds where 2,4-D, 2,4-DB, MCPB, DICAMBA and some mixtures are needed for control of such weeds as thistles and field bindweed.   |
| Annuals and Canada thistle |   | MCPB and MCPA mixture (15:1)          | 16 to 24 oz                        |   |
| Annuals and Canada thistle |   | 2,4-DB (Ester)                        | 16 to 20 oz                        |   |

Annals and sow thistle,  
Canada thistle, field  
bindweed, wild buck-  
wheat, smartweed

2,4-D (Amine)  
or  
DICAMBA  
or  
Mixtures of:  
2,4-D (Amine)  
MCPB  
DICAMBA

Directed Postemergence

Emerged weed vegetation including nut sedge (up to 6 inches in height)

Linuron +  
Oil 1 qt

1 to 2 lb  
+  
1 qt

Applied as a directed spray after the corn is 12 inches or more in height. Careful application with rigid drop pipes or other special equipment which places the spray **under the corn leaves but on the weeds** is recommended. Full instructions are on the label; follow these carefully. Used for control of weeds which have escaped a previous treatment.

Special Problems

Quack grass, and germinating weeds

Amitrole T (preplant) +  
Oil 2 lb  
+  
2 lb

Atrazine (pre- or early postemergence)

2 lb  
+  
2 lb

Apply AMITROLE T to quack grass foliage early in the spring, plow or cultivate one week later, and plant to corn. Follow up by an application of ATRAZINE pre- or postemergence. Row cultivation will add to the effectiveness of this treatment. Use where ATRAZINE residues may be a problem the following year.

Atrazine (preplant) +  
Oil 3 to 4 lb  
+  
1½ gal

Apply the first application of ATRAZINE (2 lb/acre) on emerged quack grass in the fall or early spring, plow or work 1 to 4 weeks later. After planting the corn make a second application of ATRAZINE (2 lb/acre) as recommended for preemergence or early postemergence control. Use where corn follows corn and ATRAZINE residues are not a problem.

Emergency quack grass control

Atrazine (preplant) +  
Oil 2 lb  
+  
2 lb

Apply to heavy, emerged quack grass stands. The emergency quack grass treatment, while often very effective, is seldom as effective in controlling quack grass as the carefully planned and applied split applications of ATRAZINE.

Nut sedge and germinating weeds

Atrazine (preplant) +  
Oil 2 lb  
+  
2 lb

ATRAZINE split application using 2 lb (active) per acre applied to the soil in the spring before shoots emerge and worked in to a depth of 2 to 3 inches. Make a second application of 2 lb (active) early post-emergence when the nut sedge is in the spike stage. Cultivation may be necessary to obtain good control.

## CORN HERBICIDE WEED CONTROL RATINGS

This chart is intended to help in the selection of a herbicide to control specific weeds. For complete information refer to remarks given for each chemical on the preceding pages.

The chemical ratings in this chart give general comparisons based on use as described in this publication. In unfavorable conditions (e.g. too dry, too wet, too cold, and poor spray job) the herbicides may not be as effective as shown in the chart.

| Weed Control Rating                             | ANNUAL BROADLEAVES |             |              |                 |          |                   |          |          |            |                |            |              | ANNUAL GRASSES |                 |                 |           | PERENNIALS |           |             |             | CORN TOLERANCE  |  |
|---|--------------------|-------------|--------------|-----------------|----------|-------------------|----------|----------|------------|----------------|------------|--------------|----------------|-----------------|-----------------|-----------|------------|-----------|-------------|-------------|-----------------|--|
|   | buckwheat, wild    | corn spurry | lady's-thumb | lamb's-quarters | mustards | nightshade, black | pigweeds | ragweeds | velvetleaf | barnyard grass | crab grass | fall panicum | foxtail        | old witch grass | bindweed, field | horsetail | milkweed   | nut sedge | quack grass | sow-thistle | thistle, Canada |  |
| ACTIVE CHEMICAL PER ACRE                        |                    |             |              |                 |          |                   |          |          |            |                |            |              |                |                 |                 |           |            |           |             |             |                 |  |
| SPLIT APPLICATION                               |                    |             |              |                 |          |                   |          |          |            |                |            |              |                |                 |                 |           |            |           |             |             |                 |  |
| Amitrole 2 lb +<br>Atrazine 2 lb                | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | G              | P          | P            | G              | G               | P               | P         | P          | F         | G           | P           | E               |  |
| Atrazine 2 lb +<br>Atrazine 2 lb                | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | E              | F          | F            | E              | E               | F               | F         | F          | P         | G           | E           | -E              |  |
| PREPLANT INCORPORATED                           | P                  | G           | P            | F               | P        | G                 | F        | F        | P          | E              | E          | G            | E              | E               | P               | F         | P          | G         | P           | P           | E               |  |
| Sutan 2-4 lb                                    |                    |             |              |                 |          |                   |          |          |            |                |            |              |                |                 |                 |           |            |           |             |             |                 |  |
| Sutan 2-4 lb +<br>Atrazine 1 lb                 | G                  | G           | G            | G               | G        | E                 | G        | G        | F          | E              | E          | G            | E              | E               | P               | F         | P          | G         | F           | F           | E               |  |
| Eptam 2-3 lb                                    | P                  | G           | F            | G               | P        | G                 | F        | F        | F          | E              | E          | G            | E              | E               | P               | P         | P          | E         | P           | P           | G               |  |
| Eptam 2-3 lb +<br>Atrazine 1 lb                 | G                  | G           | G            | E               | E        | G                 | E        | E        | F          | E              | E          | G            | E              | E               | P               | F         | P          | E         | F           | P           | G               |  |
| PREEMERGENCE                                    |                    |             |              |                 |          |                   |          |          |            |                |            |              |                |                 |                 |           |            |           |             |             |                 |  |
| Atrazine 1½-2 lb                                | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | G              | P          | P            | G              | G               | P               | P         | P          | P         | P           | P           | E               |  |
| Atrazine 1 lb +<br>Bladex 1½ lb                 | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | G              | E          | P            | E              | E               | P               | P         | P          | P         | P           | P           | E               |  |
| Atrazine 1 lb +<br>Lasso 2 lb                   | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | E              | E          | E            | E              | E               | P               | P         | P          | P         | P           | F           | E               |  |
| Lasso 2 lb                                      | P                  | P           | P            | F               | P        | G                 | G        | P        | P          | E              | E          | E            | E              | E               | P               | P         | P          | P         | P           | P           | E               |  |
| Bladex 3 lb                                     | G                  | -           | G            | E               | E        | E                 | F        | E        | P          | F              | E          | P            | E              | E               | P               | P         | P          | P         | P           | P           | E               |  |
| Linuron 1½ lb +<br>Ramrod 3 lb                  | E                  | -           | E            | E               | E        | G                 | E        | E        | F          | E              | E          | E            | E              | E               | P               | P         | P          | P         | P           | P           | G               |  |
| POSTEMERGENCE                                   |                    |             |              |                 |          |                   |          |          |            |                |            |              |                |                 |                 |           |            |           |             |             |                 |  |
| Atrazine 2 lb +<br>1 gal oil                    | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | E              | P          | P            | G              | E               | F               | F         | P          | F         | F           | F           | G               |  |
| Atrazine 2 lb                                   | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | G              | P          | P            | F              | G               | P               | P         | P          | F         | F           | F           | E               |  |
| Atrazine 1 lb +<br>Simazine 1 lb +<br>1 gal oil | E                  | E           | E            | E               | E        | E                 | E        | E        | F          | G              | G          | F            | F              | G               | P               | P         | P          | F         | F           | F           | G               |  |
| 2,4-D (Amine) 6-8 oz                            | F                  | P           | F            | E               | E        | E                 | E        | E        | E          | P              | P          | P            | P              | P               | F               | P         | P          | P         | P           | F           | F               |  |
| 2,4-DB 16-20 oz                                 | G                  | P           | P            | E               | G        | E                 | E        | E        | E          | P              | P          | P            | P              | P               | F               | P         | P          | P         | P           | G           | F               |  |
| 2,4-D (Amine), Dicamba<br>Mixture 8 oz total    | E                  | E           | E            | E               | E        | E                 | E        | E        | E          | P              | P          | P            | P              | P               | E               | P         | P          | P         | P           | E           | G               |  |
| DROP PIPE OR SKID<br>SPRAY                      |                    |             |              |                 |          |                   |          |          |            |                |            |              |                |                 |                 |           |            |           |             |             |                 |  |
| Linuron 1 lb +<br>1 qt oil                      | E                  | E           | E            | E               | E        | E                 | E        | E        | E          | E              | F          | E            | G              | E               | F               | E         | F          | G         | F           | G           | F               |  |

## FORAGE CROPS

### Choosing A Seed Mixture

Success with a seed mixture depends upon the correct selection of the legume and the grass components to suit the conditions under which the mixture will be grown. Simple mixtures containing one legume and one or two grasses are recommended as they are more productive than complex ones. Pure sowings of a legume or a grass are recommended under special conditions.

The selection begins with the choice of a legume to

suit the intended use, soil drainage conditions, and the duration of stand desired. The suitability of each legume can be determined by reading the information provided about mixtures based on each legume. Once the legume base has been established the specific mixture and the varieties for use in the mixture can be chosen from the recommendations under Alfalfa, Trefoil, Ladino and Red Clover. Grass species and varieties for use in mixtures with legumes or as pure stands of grass are described under grasses.



### ALFALFA-BASED MIXTURES

**ALFALFA-BASED MIXTURES** are intended for use in stored-feed and greenfeeding programs because they produce more hay, silage or green chop than any other mixture. Given good management including adequate phosphorus, potash and proper cutting management, high yields of quality livestock feed will be produced for periods up to four years. When used as pasture, these mixtures are for short-term stands only because alfalfa may thin out in two or three years. For the highest production and best persistence alfalfa mixtures should be used on well-drained soils.

Both early (Flemish) and medium maturing (Standard) alfalfa-based mixtures can be used on the farm to permit staggering of the harvest dates. The early maturing varieties develop quickly in the spring and provide more and earlier aftermath than medium maturing varieties.

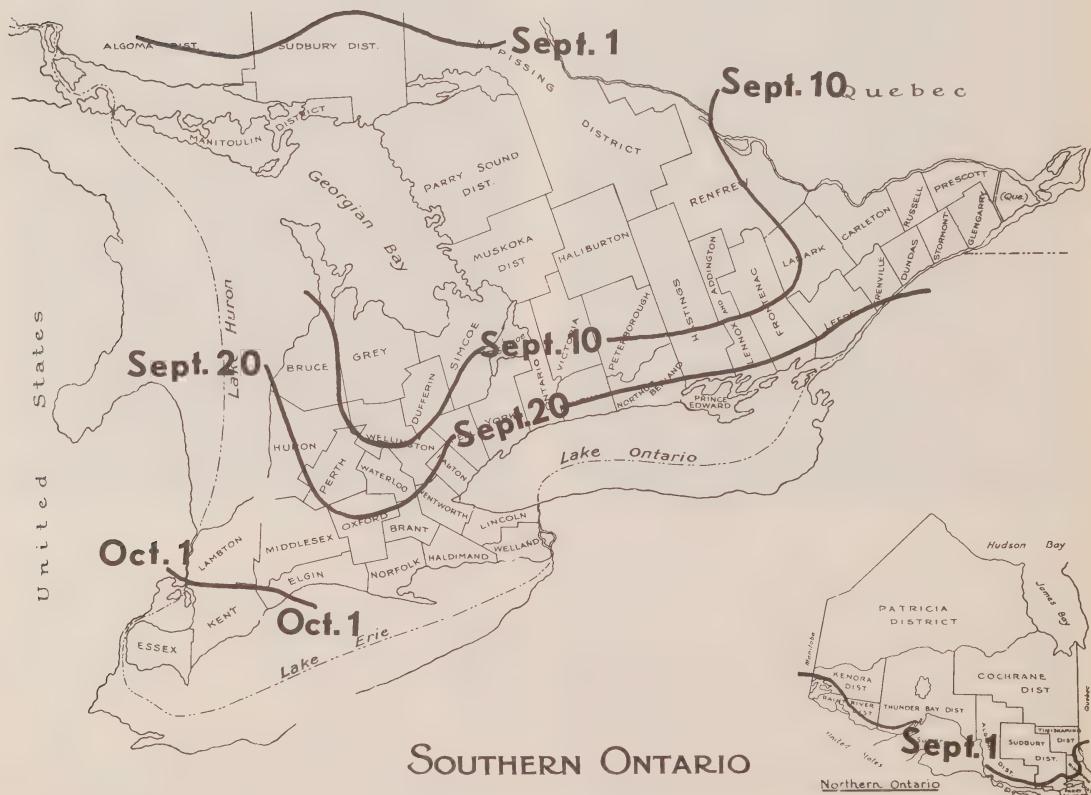
The medium maturing varieties are recommended for stored feed and pasture mixtures that mature later than those using early varieties. Some of the medium maturing varieties are preferred where winter-killing is a problem, drainage is variable, or when a pasture mixture is to be seeded.

### Management

1. Alfalfa-based mixtures may be seeded with or without a companion crop. Where high forage yields are required in the seeding year **do not** use a companion crop. Weeds must be controlled (see Weed Control, Page 30). When a companion crop is desired use oats at  $1\frac{1}{2}$  bu per acre. Remove the oat crop by controlled grazing or for stored feed if forage establishment is a problem.

- For stored feed cut at very first flower stage to obtain high quality feed.
- For pasture alfalfa must not be overgrazed. Rotational or strip grazing with adequate rest periods improve the persistence of the stand.
- High soil levels of phosphorus and potassium are required for high yields and maintenance of the stand. See Page 26 for fertility recommendations.
- Alfalfa used for stored feed or pasture must store food reserves in its roots during the fall in order to survive the winter and to regrow the following spring. When the crop is cut or grazed the food reserves in the root decline for three weeks, succeeded by a three-week replenishment period.

Since the growing period in Ontario varies from 175 to 220 days, the date when alfalfa leaves can no longer manufacture food for reserve storage also varies. Consequently in each climatic region of Ontario, alfalfa must be harvested early enough that the reserve cycle is completed or late enough that no regrowth occurs to deplete the reserves. The greatest damage occurs from harvesting at the **critical fall harvest date**. Following such a harvest, the food reserves decline but the accumulated effects of severe frosts kill the leaves and prevent reserve replenishment. Consequently, the alfalfa crop goes into the winter with the lowest possible food reserves and is therefore very subject to winterkill.



To ensure persistence and succeeding yields do not harvest alfalfa for three weeks before or after the critical fall harvest date shown on the map for each region.

## RECOMMENDED MIXTURES

| Components  | Seed Rate | Use Recommendation  |
|---|-----------|---|
| <b>STORED FEED (high dry matter silage or hay) and GREEN CHOP</b> |           |   |
| Alfalfa alone   | 12        | (Up to four years.) A special seeding for high protein-energy feed. Use only on fields where alfalfa is known to do well. High levels of fertility and control of weeds (see Page 30) are necessary. Harvest at first flower stage and store as high dry matter silage, or well-cured hay. Use early or medium maturing varieties.                                  |
| Alfalfa   | 10        | (Up to four years.) An excellent mixture for most regions. Well suited to dry environments. Recommended over alfalfa-timothy for farms having more than 3100 heat units. Use early- or medium-maturing varieties.   |
| Bromegrass  | 8         |   |
| Alfalfa   | 10        | (Up to four years.) For fields where aftermath is not required as pasture but where high quality stored feed is the main consideration. Use this high-producing mixture as one of a series to diversify the maturity date of mixtures on the farm. Use with medium-maturing alfalfas.   |
| Timothy   | 6         |   |
| Alfalfa   | 10        | (Up to four years.) For use on farms where bromegrass is being seeded for the first time. Use standard type alfalfa.  |
| Timothy   | 4         |   |
| Bromegrass  | 6         |   |
| Alfalfa   | 10        | (Up to three years.) For use on part of acreage where cutting and/or grazing can be matched with maturity of the varieties used. This early-maturing mixture demands early cutting for high digestibility and to best utilize the rapid recovery and high aftermath yield. Use early varieties only. Where ladino is adapted, $\frac{1}{2}$ lb ladino can be added. |
| Orchard   | 6         |   |
| <b>PASTURE</b>  |           |   |
| Alfalfa   | 8         | Generally not as productive after three years due to alfalfa thinning. For use as part of pasture acreage and for hay-pasture. Use in combination with mixtures containing orchard to help spread pasture production period. In Northern Ontario replace ladino with 2 lb white Dutch clover.   |
| Ladino  | 2         |   |
| Timothy   | 4         |   |
| Bromegrass  | 8         |   |
| Alfalfa   | 8         | Use in conjunction with above mixture to spread pasture production. Alfalfa, orchard, and brome give good production under dry conditions.  |
| Ladino  | 2         |   |
| Orchard   | 3         |   |
| Bromegrass  | 8         |   |
| Alfalfa   | 8         | High fertility and good management are necessary for top production. Alfalfa is included as insurance against dry conditions.   |
| Ladino  | 2         |   |
| Orchard   | 8         |   |

## DESCRIPTION OF ALFALFA VARIETIES

Both medium-maturing and early alfalfas are recommended for Ontario. The early types flower 2 to 5 days earlier than the medium types, recover faster after cutting, and produce a higher-yielding aftermath. Some early varieties are less winter-hardy and are shorter-lived than the medium types. Unless they are wilt-resistant these early strains are recommended for two years only. For the seeding year (following direct seeding) and for the first or second harvest year, early types often outyield the medium types slightly.

**SARANAC.** This early variety is wilt-resistant and quite winter-hardy. Its persistence, excellent yield, and rapid aftermath recovery combine to make it one of the most attractive varieties available to Ontario farmers today.

**ALFA, DUPUITS, GLACIER.** These three early varieties, all being susceptible to bacterial wilt\*, are recommended for short-term stands of two or possibly three years only.

**IROQUOIS, TITAN, VERNAL.** These three medium-type varieties are winter-hardy, wilt-resistant and per-

sistent. They provide better yields over a longer period of time than the earlier varieties, but the rate of aftermath recovery is slightly slower. Iroquois is better adapted than Vernal to fields with inadequate drainage and, in general, has a better aftermath recovery rate. Titan has performed as well as the other two in research tests and is essentially equivalent to Vernal.

**NARRAGANSETT.** This robust medium type variety has been a favorite on some heavier soils, but, being wilt-susceptible\*, it is anticipated that it will be gradually replaced by its near-relative, Iroquois.

Seed supplies of Saranac, DuPuits, Glacier and Vernal are adequate. Those of Alfa, Iroquois, Titan and Narragansett are moderate.

\**Bacterial wilt of alfalfa is caused by a specific type of bacteria. These organisms gain entrance to the roots through breaks in the skin and in susceptible varieties they multiply in the roots and clog up the water-transferring vessels. Affected plants begin to show symptoms of the disease in the summer of the second year, especially if the season is dry. Diseased plants appear wilted, unthrifty, and sometimes yellowish. If the bark of the roots is peeled back, discolorations will be found on the outside of the core. Such plants may live on for another year but their contribution to yield is small.*

## ALFALFA VARIETY RECOMMENDATIONS

| Variety      | Maturity | Summer Regrowth | Wilt Reaction | Hardiness | Persistence          | Suggested Grass |
|--------------|----------|-----------------|---------------|-----------|----------------------|-----------------|
| Saranac      | early    | rapid           | resistant     | very good | very good            |                 |
| Alfa         | early    | rapid           | susceptible   | very good | good, (2 to 3 years) | Brome           |
| DuPuits      | early    | rapid           | susceptible   | good      | good, (2 to 3 years) | Orchard         |
| Glacier      | early    | rapid           | susceptible   | very good | good, (2 to 3 years) |                 |
| Vernal       | medium   | medium          | resistant     | excellent | excellent            |                 |
| Iroquois     | medium   | medium          | resistant     | excellent | excellent            | Brome           |
| Titan        | medium   | medium          | resistant     | excellent | excellent            | Timothy         |
| Narragansett | medium   | medium          | susceptible   | excellent | very good            |                 |

Alfa, DuPuits and Glacier may be removed from recommendations in 1972.

## TREFOIL-BASED MIXTURES

**TREFOIL-BASED MIXTURES** are intended for use in pasture, stored feed or greenfeeding programs. They should be used only for stands of three or more years' duration.

Trefoil-based mixtures serve admirably where alfalfa is not suited because of reseeding difficulties on steeply roll-

ing or stony land, or where alfalfa grows poorly due to wet or acid soil conditions.

Under high fertility and well-drained conditions, established trefoil annually produces somewhat less forage than alfalfa. However, trefoil stands have been known to be productive for 20 years. The no-bloat feature makes trefoil an excellent long-term pasture legume.

## Management

1. Vigorous seedlings are obtained by eliminating the nurse crop, controlling weeds, and applying adequate phosphorus and potash.
2. Stands often require one year following seeding to reach maximum productivity.
3. For silage or hay harvest at early flower stage. Exercise care during harvest in order to reduce leaf loss.
4. Productive stands require annual fall application of phosphorus and potash.
5. Protection from close grazing or harvest in September is essential for good production in the following year.

## RECOMMENDED MIXTURES

| Components  | Seed Rate | Use Recommendation   |
|---|-----------|--|
| <b>STORED FEED (high dry matter silage or hay) or GREEN CHOP or PASTURE</b> |           |  |
| Trefoil alone   | 10        | Special seedings for: (A) energy and protein feed where long-term stands are required under drainage conditions unsuited to alfalfa. High levels of fertilizer and weed control (see Publication 75, <b>Guide to Chemical Weed Control</b> ) are required. Production in seeding and first harvest year may be low but subsequent harvests should be good. Direct seedings are always preferred. Expect production for 10 years or more from well-managed stands. (B) Use in renovating low-producing, rough or unfillable pastures. By applying trefoil, fertilizer and herbicides transform these fields into more productive grassland in a period of two years. Free from the danger of bloat. |
| Trefoil<br>Timothy  | 8<br>2    | (Three or more years.) For long-term stands on fields not suited to regular rotations. Use Viking for early and Empire for late hay. This mixture is suitable also for use on acid soils. Use Empire for long-term pastures especially under variable or wet soil conditions. Free from danger of bloat.   |

## DESCRIPTION OF TREFOIL VARIETIES

Four varieties are now recommended for Ontario. These four differ in seedling vigor, growth habit, maturity, hardiness, area of adaptation, and in their ability to withstand flooding and poor drainage. They are all approximately equal in yield potential.

**EMPIRE**, currently the most widely used trefoil variety in Ontario, is both winter-hardy and tolerant of inadequate drainage. It is somewhat deficient in seedling vigor but once established it can be depended on to persist for many years. It is recommended for all parts of the province and is especially valuable as a long-term pasture crop in Southern Ontario. Empire blooms 10 to 14 days later than medium-maturing alfalfa and 12 to 16 days later than Viking. Seed supplies are adequate.

**LEO** is a robust variety with better seedling vigor than Empire, excellent winterhardiness, and good tolerance to inadequate drainage. It blooms 6 to 8 days later than Viking, and 4 to 6 days earlier than Empire, has a more vigorous growth habit in the spring than Empire, and a

faster aftermath recovery rate, but it terminates its growth earlier in the fall than the other varieties. It is recommended for all parts of Ontario for both hay and pasture. Seed supplies are limited for 1971.

**VIKING** has a more upright growth habit than either Empire or Leo. It has more seedling vigor, starts growth earlier in the spring, and has a better aftermath recovery rate than Empire. However, it is less winter-hardy and will not withstand poor drainage. It is not recommended for use in northern Ontario but is useful, either as hay or as hay aftermath pasture, on sites in southern Ontario where drainage is not a problem. Viking comes into bloom at about the same time as early alfalfa. Seed supplies are limited for 1971.

**MAITLAND**, a new variety for 1971, is essentially equivalent to Viking in growth habit, yield and recommended usage. Maitland possesses a little more seedling vigor and hardiness than Viking. Seed supplies are limited for 1971.

## BIRD'S-FOOT TREFOIL VARIETY RECOMMENDATIONS

| Variety  | Date of First Flower at Guelph | Regrowth | Tolerance to Variable Drainage | Suggested Grass |
|----------|--------------------------------|----------|--------------------------------|-----------------|
| Empire   | July 1                         | Slow     | Excellent                      | Timothy         |
| Leo      | June 23                        | Medium   | Excellent                      | Timothy         |
| Viking   | June 15                        | Medium   | Poor                           | Timothy         |
| Maitland | June 16                        | Medium   | Poor                           | Timothy         |

## LADINO-BASED MIXTURES

**LADINO CLOVER MIXTURES** perform best as pastures, particularly in areas where moisture is plentiful and winterkilling is not a problem. They are difficult to cure as hay but make excellent silage. Orchard grass performs

well in combination with ladino, making an early-maturing mixture. Ladino pasture presents a bloat hazard unless it is combined with grasses (e.g. orchard grass) that are productive at the same time.

### Management

1. Where protein feed is sought, harvest and ensile before blooms appear.
2. Restrict grazing in autumn to leave protective cover of leaves and grasses on overwintering creeping stems of ladino.
3. Controlled grazing management helps the stand remain productive for a period of years.

## RECOMMENDED MIXTURES

| Components         | Seed Rate | Use Recommendation   |
|--------------------|-----------|--|
| <b>STORED FEED</b> |           |  |
| Ladino             | 4         | (For one year.) For protein production on fertile, moist soils. Makes excellent silage. Ladino has the highest content of protein among the legume forages. Four cuttings could be harvested, beginning about the end of May. Ladino is difficult to cure for hay. |
| <b>PASTURE</b>     |           |  |
| Ladino             | 2         | Not often productive after three years. Use where ladino is adapted. Ladino and orchard grass grow best when moisture and winterkilling are not problems. High fertility and good management required for top production. In dry areas add 8 lb alfalfa.           |
| Orchard            | 8         |  |

## LADINO VARIETY DESCRIPTION

**MERIT** Ladino clover is the result of an Iowa selection program emphasizing yield, winterhardiness, and tolerance to summer drought. In tests across Ontario it has outyielded, on the average, all other Ladino strains. When moisture is plentiful and temperatures are normal, it re-

covers more rapidly after cutting or grazing than common white clover. It is at least as hardy as Certified Ladino imported from the United States, and is recommended for use wherever Ladino is used in Ontario. There is an adequate supply of seed for 1971.

## LADINO VARIETY RECOMMENDATIONS

| Variety | Date of First Flower at Guelph | Regrowth | Tolerance to Variable Drainage | Suggested Grass |
|---------|--------------------------------|----------|--------------------------------|-----------------|
| Merit   | June 10                        | Rapid    | Good                           | Orchard grass   |

## RED CLOVER-BASED MIXTURES

**RED CLOVER-BASED MIXTURES** are suited only for short-term stands for stored feed. Red clover produces well for one year and sometimes slightly in the second

harvest year. Early disappearance of red clover leaves grass alone to produce. Do not use in pasture mixtures.

### Management

1. Harvest for stored feed at early bloom if top quality feed or a seed crop is expected from aftermath.
2. Recommended for short-term stands only. They can produce longer provided nitrogen is applied for the grass in the second and subsequent years.

### RECOMMENDED MIXTURES

| Components         | Seed Rate | Use Recommendation  |
|--------------------|-----------|---|
| <b>STORED FEED</b> |           |   |
| Red Clover         | 6         | (One year.) For fields where hay is the main consideration. Little clover can be expected in the second year. If mixture maintained, fertilize with nitrogen for second and subsequent harvest years. |
| Alsike             | 2         |   |
| Timothy            | 6         |   |
| Red Clover         | 6         | (One year.) For short-term stands of hay. If kept more than one crop year, use nitrogen in order to maintain production, but recognize the higher cost of the hay.                                    |
| Timothy            | 6         |   |

### RED CLOVER

**DOLLARD, LAKELAND and OTTAWA.** These three varieties are very similar in yield, maturity and persistence. They are more persistent in the second year of production than Canadian double-cut, and are recommended where stands will be harvested for two years. Seed supply is limited for 1971.

**HUNGAROPOLI** is a new hardy variety introduced from Europe that matures later than Dollard. Because it

is susceptible to powdery mildew it is recommended for use in Northern Ontario only. Seed is in moderate supply for 1971.

**CANADIAN DOUBLE-CUT** red clover is uncertified seed produced in Canada. For one harvest year it is equal in yield to Dollard, Lakeland and Ottawa. Canadian double-cut is superior to imported seed of British or U.S. origin.

### RED CLOVER VARIETY RECOMMENDATIONS

| Variety      | Date of First Flower at Guelph | Regrowth | Tolerance to Variable Drainage | Suggested Grass |
|--------------|--------------------------------|----------|--------------------------------|-----------------|
| Dollard      | June 18                        | Medium   | Good                           | Timothy         |
| Lakeland     | June 18                        | Medium   | Good                           | Timothy         |
| Ottawa       | June 18                        | Medium   | Good                           | Timothy         |
| *Hungaropoli | —                              | Medium   | Good                           | Timothy         |

\*For use in Northern Ontario only — susceptible to mildew

### GRASSES

**GRASSES USED IN MIXTURES WITH LEGUMES** should be in the boot stage of growth or have the heads just emerging when the legumes reach first flower to ensure best yields of top-quality forage. Grasses that reach the boot to heading stage of growth at the same time as the various legumes are suggested in the legume and grass variety recommendations.

**PURE GRASS STANDS** including mixtures of grasses or one species perform well where legumes cannot be included because of poor drainage or extremely acid conditions. They require large amounts of nitrogen to provide high yields. Split applications of nitrogen are preferred, e.g. one application after each harvest.

## Management

1. Apply 50 lb per acre of nitrogen early each spring, and again after each cutting.
2. Harvest the grass at the "heads just emerged" stage of growth for top-quality stored feed.
3. Where grasses are included in mixtures with legumes, harvest according to the recommended stage of the legume and fertilize for the legume (see Page 26).

## RECOMMENDED SEEDING RATES

| Pure Stand Of | Seed Rate Lb/Ac | Use Recommendation  |
|---------------|-----------------|---|
| Reed Canary   | 8               |   |
| Brome         | 10              |   |
| Timothy       | 8               |   |
| Orchard       | 8               | Use where legumes are not suited. The adaptation of each species is outlined in the following species descriptions. High soil levels of nitrogen, phosphorus and potassium are required for good production of pure grass stands. |

## DESCRIPTION OF GRASS SPECIES AND VARIETIES

**BROMEGRASS** is important for early and late cut hay. Harvested at the recommended "heads emerged" stage, it is higher in digestibility than timothy. At more advanced stages of maturity it is higher in digestibility than any other species. Furthermore, brome produces slightly more aftermath than timothy and combines very well in alfalfa mixtures.

For early pasture bromegrass is superior to any of the other forage grasses. Used in mixtures it permits early grazing in the spring and good growth during the summer, but can be faulted for lack of growth in the fall. As a general hay and pasture crop, however, bromegrass is a very important Ontario forage.

Clipped brome seed will be available from some sources again this spring. It is seed which has been trimmed mechanically to remove part of the hull and allow it to feed through the seeder better than unclipped seed. It flows better, is easier to sow, and gives a more uniform distribution than is usually the case with bromegrass seed.

**BAYLOR, REDPATCH and SARATOGA.** These three varieties are recommended above all other varieties for all brome plantings. They are high in seedling vigor, early spring growth and aftermath. Seed supplies of any individual variety may be in limited supply; however, since the three varieties can be readily interchanged the total seed supply should be adequate for 1971.

These varieties are strong competitors and are the only good brome varieties for mixtures with early varieties of alfalfa. In pasture mixtures or with early alfalfa, orchard grass is a good alternative to these varieties.

**LINCOLN.** This variety is less vigorous than the other three, but higher in yield than Canadian Commercial. Seed supply for 1971 is limited.

**ORCHARD GRASS** is an early-maturing forage that grows and matures well with early alfalfa varieties or Ladino clover. Cut for stored feed, it is higher in digestibility than brome or timothy harvested at comparable stages.

Orchard grass grows back immediately after cutting or grazing. It is our best grass for aftermath production, and is capable of counteracting the bloating effect of alfalfa and the clovers. In well-managed pasture and hay-pasture mixtures, orchard grass makes very palatable food. Its fast growth and good production, however, must be fully utilized. It is an excellent grass for the good grassland man on well-drained sites. Surface drainage to take runoff is necessary to maintain stands.

**FRODE and TARDUS II.** These two Swedish varieties are equal in performance. They are higher in yield and more leafy than most seed lots of common. There is an adequate seed supply of both varieties for 1971.

**RIDEAU.** This variety is 5 to 10 days later in maturing, and leafier than Frode and Tardus II. It is slightly lower in yield. Seed supplies for 1971 are limited.

**TIMOTHY** has long been the basic meadow grass in Ontario. Timothy grows under a wider range of environments than any other grass used, and is easy to establish and maintain. It is well adapted to the heavier soil types and variable drained fields. Cut at the heading stage, timothy is a high-yielding, high quality grass, for hay. Like all grasses, it contains about half the crude protein content found in alfalfa. For pasture or in hay aftermath, timothy is a lower producer than orchard or brome. Palatable and high-yielding in the spring, it grows back slowly after cutting or grazing, and produces relatively poor growth during the dry midsummer. However, timothy adds stand insurance and consequently small to moderate amounts are useful when making new seedings with legumes.

**CHAMP,** which is earlier than Climax, will give a quarter more aftermath production than Climax under good moisture and fertility conditions. It would be preferred for long-term hay-pasture or pasture mixtures. Seed supplies are adequate for 1971.

**CLIMAX.** This variety is later and leafier than common. Seed supplies are adequate for 1971.

**MILTON.** Recommended for the first time in 1971. Milton is similar in yield, maturity and aftermath production to Climax and can be used in the same mixtures as Climax. Milton often appears to be less leafy than Climax. Seed supplies are adequate for 1971.

**REED CANARY GRASS,** although adapted to dry upland soils, is used only on land subject to prolonged periods of flooding. Slow to establish, stands thicken after the first year and generally resist weed invasion. The very tall coarse growth obtained from reed canary is best utilized

for stored feed in the form of silage or haylage. As dry hay, it lacks in palatability unless cut no later than early heading. It produces good aftermath yields.

For pasture, reed canary grass is low in palatability. Cattle accept it more readily, however, if it is well fertilized. Although it is a good pasture producer on wet land, it should not be used if the land will grow bird's-foot trefoil.

**FRONTIER.** This variety is higher yielding than the common type but seed supply is limited in 1971.

### GRASS VARIETY RECOMMENDATIONS

| Variety                  | Heading Date<br>Guelph | Aftermath Recovery | Aftermath Production | Tolerance to Variable Drainage | Suggested Legume               |
|--------------------------|------------------------|--------------------|----------------------|--------------------------------|--------------------------------|
| <b>BROMEGRASS</b>        |                        |                    |                      |                                |                                |
| Baylor                   | June 15                | Medium             | Good                 | Fair                           | Early or Medium Alfalfa        |
| Redpatch                 | June 15                | Medium             | Good                 | Fair                           | Medium Alfalfa                 |
| Saratoga                 | June 15                | Medium             | Good                 | Fair                           | Medium Alfalfa                 |
| Lincoln                  | June 15                | Slow               | Fair                 | Fair                           | Medium Alfalfa                 |
| <b>ORCHARD GRASS</b>     |                        |                    |                      |                                |                                |
| Frode                    | June 8                 | Rapid              | Excellent            | Poor                           | Early Alfalfa or Ladino clover |
| Rideau                   | June 12                | Rapid              | Excellent            | Poor                           | or                             |
| Tardus II                | June 8                 | Rapid              | Excellent            | Poor                           | Ladino clover                  |
| <b>TIMOTHY</b>           |                        |                    |                      |                                |                                |
| Champ                    | June 20                | Medium             | Good                 | Good                           | Medium Alfalfa or              |
| Climax                   | June 24                | Slow               | Fair                 | Good                           | Bird's-foot Trefoil or         |
| Milton                   | June 24                | Slow               | Fair                 | Good                           | Red clover                     |
| <b>REED CANARY GRASS</b> |                        |                    |                      |                                |                                |
| Frontier                 | June 10                | Medium             | Excellent            | Excellent                      | None                           |

### Annual Crops for Forage in Southern Ontario

#### SPRING PASTURE

**AUTUMN-SEEDED FALL RYE**, seeded at  $2\frac{1}{2}$  bu per acre, can be grazed for a short period in the spring, preferably after the stems start to form. Keep stock off when wet. Another pasture or green chop crop (e.g. corn) may follow the rye in intensive programs.

#### SUMMER GREEN CHOP OR PASTURE

**CORN.** Seeded early in May. Use hybrid seed or grain from the crib if germination is satisfactory. Seeding rate of 60 lb per acre is adequate. No aftermath can be expected. Controlled grazing (e.g. fresh daily) makes the most efficient use of the crop when pastured after it reaches a height of 36 inches.

**OATS.** Seed any time in the season to produce pasture in eight weeks. Use  $2\frac{1}{2}$  bu per acre. Graze when stems are forming. No aftermath can be expected.

**SUDAN-SORGHUM HYBRIDS or HYBRID SUDAN GRASSES.** Seed in mid-May to early June at 12 lb per acre in 7- or 14-inch rows; ready to harvest in early August. Do not graze before growth is 24 inches high or during periods of severe drought or for three days following a frost, as prussic acid poisoning could occur. If frozen, graze only after a couple of days following the last frost. High aftermath yield possible only in hot, moist conditions or after very early first harvest.

#### AUTUMN PASTURE

**OATS.** Seeded at  $2\frac{1}{2}$  bu per acre before August 15, ready for grazing by October 1.

**RAPE.** Seed in early July at  $1\frac{1}{2}$  lb per acre in 28-inch rows. May be seeded in solid stands, but yields are 25% lower. Pasture in late October. Makes good hog, sheep or beef pasture. Taints milk.

**FALL RYE.** Seeded by August 1, at  $2\frac{1}{2}$  bu per acre, gives good fall pasture by October 1.

## SILAGE CROPS

Any of the annual forages can be made into silage. The immature crop commonly has lower yield than the mature crop. Corn is the most important silage crop.

## Fertilizers for Hay and Pasture Crops

Forage crops have the capacity to produce high yields of total digestible nutrients (TDN) per acre. To obtain high yields, high fertility levels are required. Legumes, with the possible exception of bird's-foot trefoil, generally are not tolerant of acid soil conditions. Acid soils (pH 6.0 or lower) should be limed one year before seeding, at rates indicated by soil tests. Spreading manure on snow may cause an ice pack to form under the manure and smother the legumes (alfalfa, trefoil, red clover, ladino).

The timing of fertilizer application may influence the response obtained. An annual broadcast fertilizer application is recommended for established stands. **Phosphorus and potassium are necessary to maintain forage stands.** Potassium is best applied in August or early

September. Phosphorus, if required, may be included or can be applied in the spring or summer. Potassium is particularly important on sandy or loamy soils.

**For grass stands nitrogen should be applied as early as possible in the spring.** If more than 50 lb of total nitrogen (N) per acre is required, a portion (up to 50 lb of N per acre) should be applied in late August or early September. Nitrogen applied in early fall stimulates tillering and early spring growth. It rarely pays to fertilize old bluegrass pastures. It is profitable to fertilize grass stands consisting of productive grasses such as brome, orchard or timothy. However, it is usually profitable to reseed grass stands to a suitable legume rather than to fertilize them.

**Fertilizer needs should be determined from a soil test.** The fertilizer rates suggested from soil tests are designed to produce highest economic yields when accompanied by good or above-average management. The following general fertilizer recommendations should be followed only when a soil test report is not available.

## FERTILIZERS FOR HAY AND PASTURE CROPS

| Crop   | Conditions  | Soil           | Recommended Plant Food<br>(lb per acre)<br>P,O,<br>K,O |    |     | Ratio | Suggested<br>Recommendation<br>Analysis | Rate |
|--|-------------|----------------|--|----|-----|-------|---|------|
| NEW SEEDING — Seeded with a companion crop OR direct-seeded without a companion crop           | At Planting | Sandy or Loamy | 15   | 60 | 60  | 1-4-4 | 6-24-24                                 | 250  |
| Fall — Seeded with a companion crop OR direct-seeded without a companion crop                  | Topdressing | Clay           | 15   | 60 | 30  | 1-4-2 | 8-32-16                                 | 200  |
| ESTABLISHED STANDS — Legumes occupy one-half or more of the stand (6 or more plants per sq ft) | Legumes     | Sandy or Loamy | 0  | 40 | 120 | 0-1-3 | 0-10-30                                 | 400  |
| Legumes — Legumes occupy one-third to one-half of stand (3 to 5 plants per sq ft)              |             | Clay           | 0  | 40 | 40  | 0-1-1 | 0-20-20                                 | 200  |
| Grass — Legumes occupy less than one-quarter of stand (2 or less plants per sq ft)             |             | Sandy or Loamy | 120  | 40 | 120 | 0-1-3 | 0-10-30 plus Ammonium Nitrate           | 400  |
|  |             | Clay           | 120  | 40 | 40  | 0-1-1 | 0-20-20 plus Ammonium Nitrate           | 375  |
|  |             |                |  |    |     |       | Ammonium Nitrate                        | 375  |

NOTE: Where manure is applied (10 or more tons per acre) reduce the rate of fertilizer application to ONE-HALF of the suggested recommendation.

## INSECT CONTROL IN FORAGE CROPS

(See also Pages 54 to 55)

**ARMYWORM.** Maintain a close watch for outbreaks in grasses in late June and July. If they become destructive, control them as indicated on Page 39 under "Grain Crops".

**CEREAL LEAF BEETLE.** Refer to Page 39 (Grain Crops section) concerning movement of hay.

**ALFALFA WEEVIL** is now distributed throughout all of southwestern Ontario (40 counties). It is expected that half of the alfalfa grown in this region will require a control measure in 1971. The counties closest to the lakes are the most heavily infested.

**The key to weevil control is proper timing of harvest and treatment, based on field inspection.** Examine each field twice a week from mid-May to mid-June. Check about eight areas of one square yard each. Half of these should be near the edges and the remainder scattered within the field. This procedure is necessary because insect populations can vary considerably within a field and between nearby fields.

**First cut — Cut early** (just before first bloom opens) and **remove** from the field as soon as possible. However, if 25 to 50% of the leaves on the upper third of the stems show feeding injuries and it is not possible to cut the crop immediately, treat with one of the recommended

insecticides — subject to consideration of the important notice below (re Use of Insecticides).

**Second cut —** Carefully check the early regrowth (aftermath). If damage was readily apparent in the first cut, larval survival and feeding may continue. If feeding is readily evident, apply an insecticide to the stubble and new growth. Refer to notice below.

### USE OF INSECTICIDES

1. From experiments conducted in Ontario it was determined that insecticides will pay only if a forage stand consists of at least 50% alfalfa.
2. The alfalfa weevil has declined to harmless levels in Quebec and several northeast States. Parasites (tiny wasps) introduced into these regions may well be responsible for the decline. Several species of parasites are now established in Ontario. The use of insecticides will kill and thus hinder their buildup. Only when large populations of the parasites are present will they be able to exert a controlling influence on the weevil.

See Pages 54 and 55 for information on the proper use of pesticides, time interval between treatment and harvest or grazing to prevent residue problems, and spray equipment.



Moderate to heavy feeding damage by alfalfa weevil larvae

## INSECTICIDES RECOMMENDED FOR USE IN ALFALFA WEEVIL CONTROL

| Insecticide Formulation                             | Rate per Acre                 | Minimum Days To Cutting | Comments   |
|---|-------------------------------|-------------------------|--|
| 1. malathion 50% EC                                 | 1½ to 2 pints                 | 1                       | Less effective below 60°F. Hazardous to bees.  |
| 2. carbaryl (Sevin) 80S<br>or<br>85W<br>or<br>50 WP | 2 lb<br><br>1¾ lb<br><br>3 lb | 1                       | Crop injury possible if applied when hot, humid, or wet. Very toxic to bees. Wettable powders cannot be applied with low gallonage equipment (4 to 45 gal per acre). |
| 3. methoxychlor 24% EC<br>or<br>50% WP              | 5 pints<br><br>3 lb           | 7                       | Relatively safe to bees. Wettable powders cannot be applied with low gallonage equipment (4 to 45 gal per acre).   |
| 4. Imidan 50% WP                                    | 2 lb                          | 7                       | Do not apply when crop is in bloom.  |
| 5. Carbofuran (Furadan) 4.8 F                       | 4 fl oz                       | 14                      | Highly toxic to bees.  |

EC — Emulsifiable Concentrate; S — Sprayable; WP — Wettable Powder; F — Flowable

If you propose to spray an in-bloom forage crop,  
heed the warning about bees on Page 54.

## CHEMICAL WEED CONTROL IN FORAGES

Always read and follow the instructions which the manufacturer has printed on the herbicide label. This will give you further information on how to apply the chemical and on conditions which will affect results. This can save you money and help prevent crop damage.

| Forages                             | Weed Situation          | Chemical  | Rate per Acre<br>Active Ingredient                                 | Remarks  |
|-------------------------------------|-------------------------|---|--|--|
| <b>Wheat, Oats,<br/>Barley</b>      |                         |   |  |  |
| <b>Underseeded<br/>to:</b>          |                         |   |  |  |
| Grass seed-<br>lings                | Many broadleaf<br>weeds | 2,4-D (Amine)<br>or<br>MCPA<br>or<br>2,4-DB<br>or<br>MCPB | not over 6 oz<br>not over 8 oz<br>not over 20 oz<br>not over 20 oz | While seedling grasses are more resistant to 2,4-D than legumes, they should be well established before spraying.  |
| Alfalfa —<br>Medium<br>maturity     | Many broadleaf<br>weeds | 2,4-D (Amine)<br>or<br>MCPA<br>or<br>2,4-DB               | not over 2 oz<br>not over 4 oz<br>not over 20 oz                   | Rates of 2 to 4 oz 2,4-D or 4 oz MCPA are useful if common mustard or other very susceptible weeds dominate the stand. When using these materials it is necessary to have a canopy of cereal or weed leaves to protect the legumes. Do not use pressures over 40 psi.  |
| Alfalfa —<br>Early<br>maturity*     | Many broadleaf<br>weeds | 2,4-DB  | not over 20 oz   | The rates of 2,4-DB or MCPB shown will give better control of many broadleaf weeds, including Canada thistle, than the rates of 2,4-D or MCPA. 2,4-DB or MCPB should be applied when the legumes are in the 1 to 3 trifoliate stage. Later applications may check the legumes severely. Under drought or other stress conditions 2,4-DB may injure seedling legumes. |
| Red, Alsike,<br>or Ladino<br>Clover | Many broadleaf<br>weeds | 2,4-D (Amine)<br>or<br>MCPA<br>or<br>2,4-DB<br>or<br>MCPB | not over 4 oz<br>not over 4 oz<br>not over 16 oz<br>not over 20 oz | Mixtures of MCPB and MCPA (15:1) should be used instead of MCPB where mustard is a problem. 2,4-DB will kill mustard if applied when the mustard is 1 to 2 inches high.  |
| Bird's-foot<br>Trefoil              | Many broadleaf<br>weeds | 2,4-D (Amine)<br>or<br>2,4-DB                             | not over 4 oz<br>not over 16 oz                                    | MCPB is safer on red and alsike clover than 2,4-DB and should be used when these clovers are seeded alone or when they dominate the seedling stand. When alfalfa dominates in a red clover alfalfa mixture use the 16 oz rate of 2,4-DB.   |

|   |   |              |                |   |
|---|---|--------------|----------------|---|
| Alfalfa and grass seedlings                                 | Many broadleaf weeds including smartweed and wild buckwheat | Bromoxynil   | 6 oz           | Apply at the 2- to 4-leaf stage of weed growth before the cereals have more than 5 leaves. Since BROMOXYNIL moves very little within the plant, it is necessary to cover the weeds thoroughly with spray. A higher rate of water should be used when the weeds are in the 4-leaf stage or partly covered by the cereal leaves. BROMOXYNIL usually causes some burn of the legume leaves but new growth usually appears quickly. (Registration pending.) |
| Alfalfa with or without forage grasses                      | Many broadleaf weeds including smartweed and wild buckwheat | 2,4-DB       | 12 to 16 oz    | 2,4-DB should be applied when the legumes have no more than 3 true leaves. Usually suppresses legume growth for a period of 2 to 3 weeks. Under drought, high temperature or other stress conditions, 2,4-DB may severely injure seedling legumes.  |
| Many broadleaf weeds including smartweed and wild buckwheat |   | Bromoxynil   | 6 oz           | Apply when the weeds and alfalfa are in the 2- to 4-leaf stage of growth. Usually causes some burn to leaves of alfalfa seedlings but new growth appears quickly. Do not apply during severe drought or when temperatures are 80°F or higher. Use 20 gal water/acre to assure good weed coverage. (Registration pending.)   |
| Pure stands of Alfalfa and Bird's-foot Trefoil              | Many annual grasses   | Dalapon      | 4 lb (product) | Apply to emerged grass when the legume seedlings have not more than 3 true leaves. Do not graze or feed foliage treated with DALAPON to meat or dairy animals during the crop year of application.  |
| Nut sedge and many germinating grass and broadleaf weeds    |   | EPTC (EPTAM) | 3 lb           | Preplant-incorporated. EPTC should be applied to a dry soil surface and incorporated into the soil immediately (within 10 minutes) with a double disk. A second incorporation at right angles with a disk in tandem with a harrow should be done as soon as possible.   |

\*The varieties DuPuits, Alfa, Saranac, and Glacier are early-maturing alfalfa.

| Forages   | Weed Situation                                     | Chemical             | Active Ingredient | Rate per Acre         | Remarks  |
|---|--|----------------------|-------------------|-----------------------|--|
| <b>Established Legumes</b>  |  |                      |                   |                       |  |
| Pure stands and mixture containing Alfalfa or Bird's-foot Trefoil | Canada thistle and chicory                         | 2,4-DB               |                   | 16 to 20 oz           | Spot treatment only. Do not use if crop is intended for seed production later in season. Apply when weeds are in the 2- to 3-leaf stage. Apply in early spring or after cutting, or in the fall after legumes become dormant.  |
| Pure stands and mixtures containing Red or Alsike Clover          | Canada thistle and chicory                         | MCPB                 |                   | 16 to 24 oz           | Spot treatment only. Do not use if crop is intended for seed production later in season. Apply when weeds are in the 2- to 3-leaf stage. Apply in early spring or after cutting, or in the fall after legumes become dormant.  |
| Alfalfa and Trefoil seed fields                                   | To prevent seeding establishment                   | Simazine             |                   | 1 lb                  | Apply from September to November only. Prevents the establishment of legume and weed seedlings. Do not apply paraquat within 1 year after the SIMAZINE treatment.  |
| Suppression of grasses, red clover, and alsike clover             | Dalapon  |                      | 5 lb (product)    |                       | Applied in the fall when growth is about 6 inches high. Spring treatments may result in seed yield reduction.  |
| Alfalfa and Trefoil   | Control or suppression of grasses and annual weeds | Paraquat (Gramoxone) |                   | $\frac{1}{2}$ to 1 lb | Apply to trefoil for seed when the trefoil is 3 to 6 inches high in the spring. Apply to alfalfa or trefoil for forage within 5 days after cutting. PARAQUAT should not be applied within 1 year after a SIMAZINE treatment. PARAQUAT kills the foliage it contacts but most perennials recover from this treatment. |

## GRAIN CROPS

Grain crops deserve to be treated as first-rate crops whenever they are included in a cropping program. They must compete for their place in that program by producing high yields economically. To produce high yields requires that all parts of the grain production package be considered. No one factor can support high yields without the others. No one factor can be neglected without a corresponding decrease in yields.

Improved varieties express their full potential only when

they are used in combination with proper seeding times, seeding depth, and recommended seeding rates as well as adequate fertility applications. Indeed they perform well only when diseases, insects, and weeds are eliminated as production hazards.

Integrating the production practices into a package becomes the problem of the farmer. On his ability to do this rests the final yield and outcome of his grain production program.

### 1971 Grain Variety Recommendations

Variety recommendations are general guides for choosing a variety. Descriptive tables accompanying recommendations show characteristics for each variety which may limit its use. Because no variety is perfect, the recommendations should be coupled with experience and information from the description to choose a variety for your use.

Yield data, presented as hundredweight (cwt)/acre, is included to indicate the relative yield performance of recommended varieties in each of the six testing areas in Ontario. The testing areas are listed below and can be outlined by using the heat unit map on Page 6.

Test Area I — Southwest of the 2900 heat unit line.

Test Area II — West of Frontenac, between the 2900 and 2300 heat unit lines.

Test Area III — East of Frontenac, between the 2900 and 2300 heat unit lines.

Test Area IV — The Dundalk plains (Grey, Dufferin and Wellington) within the 2500 heat unit line.

Test Area V — Northern Ontario between the 2300 and 1900 heat unit lines.

Test Area VI — Northern Ontario — north of the 1900 heat unit line.

Variety recommendations for grains to be stored and used as high moisture grains and whole plant silages are the same as those to be used for normal grain storage and use.

## SPRING GRAINS

All spring grains respond with higher yields to early seeding. Plant as early as soil conditions permit. The target date for the Guelph area should be April 15.

### BARLEY

#### Recommendations

##### Varieties for Feed

HERTA

BROCK

KEYSTONE

CHAMPLAIN

} All areas

All areas where mildew is not a problem

All areas where lodging and mildew are not problems

##### Varieties for Feed or Malting

FERGUS

All areas

##### Varieties for Malting

CONQUEST

PARAGON

} All areas if malting quality is required

### Barley Variety Descriptions

| Variety              | Type and Maturity                           | Height          | Lodging Resistance | Reaction to Disease* |        |
|----------------------|---|-----------------|--------------------|----------------------|--------|
|                      |   |                 |                    | Loose Smut           | Mildew |
| BROCK<br>(6-row)     | Smooth-awned, medium                        | Medium          | Medium             | R                    | R      |
| CHAMPLAIN<br>(6-row) | Smooth-awned 2 to 3 days earlier than Herta | Medium to tall  | Medium to weak     | T                    | S      |
| CONQUEST<br>(6-row)  | Smooth-awned, midseason                     | Medium          | Medium to good     | R                    | S      |
| FERGUS<br>(2-row)    | Rough-awned late                            | Medium to short | Medium             | T                    | R      |
| HERTA<br>(2-row)     | Rough-awned, late                           | Medium to short | Medium             | T                    | R      |
| KEYSTONE<br>(6-row)  | Smooth-awned, midseason                     | Medium          | Good               | R                    | S      |
| PARAGON<br>(6-row)   | Smooth-awned, midseason                     | Medium          | Medium to good     | R                    | S      |

\*See also Disease and Insect Control Recommendations, Page 38.

R = resistant; S = susceptible; T = tolerant

### Barley Variety Yields\* — cwt/acre

| Variety   | Testing Area |            |             |           |          |           |
|-----------|--------------|------------|-------------|-----------|----------|-----------|
|           | I<br>(8) **  | II<br>(17) | III<br>(12) | IV<br>(3) | V<br>(8) | VI<br>(3) |
| Brock     | 27           | 30         | 25          | 29        | 30       | 41        |
| Champlain | 30           | 26         | 25          | 27        | 28       | 42        |
| Conquest  | 27           | 27         | 23          | 28        | 30       | 40        |
| Fergus    | 27           | 28         | 23          | 29        | 29       | 39        |
| Herta     | 28           | 27         | 23          | 26        | 28       | 39        |
| Keystone  | 27           | 30         | 24          | 28        | 30       | 38        |
| Paragon   | 26           | 28         | 24          | 28        | 32       | 44        |

\*Three-year average (1968-70)

\*\*Number of tests

### OATS

#### Recommendations

**GARRY** }  
**SIOUX** } All areas

**DORVAL** All areas on farms where lodging is not a problem

**STORMONT** All areas on farms where lodging is a problem

### Oat Variety Descriptions

| Variety  | Seed Size | Height         | Lodging Resistance | Maturity                                 | Reaction to Septoria | Smut | Disease* |
|----------|-----------|----------------|--------------------|--|----------------------|------|----------|
|          |           |                |                    |  | S                    | S    | S        |
| DORVAL   | Medium    | Medium to tall | Medium to weak     | 3 to 5 days later than Garry             |                      |      |          |
| GARRY    | Medium    | Medium to tall | Medium to good     | midseason 2 to 3 days earlier than Herta | S                    | R    | MR       |
| SIOUX    | Medium    | Medium to tall | Medium             | midseason                                | S                    | R    | MR       |
| STORMONT | Large     | Short          | Good               | 2 to 4 days earlier than Garry           | T                    | R    | MR       |

\*See also Disease and Insect Control Recommendations, Page 38.

R = resistance; S = susceptible; T = tolerant; MR = moderately resistant

### Oat Variety Yields\* — cwt/acre

| Variety  | Testing Area |            |             |           |          |            |
|----------|--------------|------------|-------------|-----------|----------|------------|
|          | I<br>(7) **  | II<br>(15) | III<br>(14) | IV<br>(4) | V<br>(8) | VI*<br>(2) |
| Garry    | 29           | 30         | 23          | 28        | 24       | 40         |
| Stormont | 25           | 26         | 20          | 28        | 23       | 33         |
| Dorval   | 29           | 30         | 26          | 31        | 27       | 46         |
| Sioux    | 28           | 30         | 24          | 27        | 25       | 45         |

\*Three-year average (1968-70) except Area VI which is a two-year average (1969-70)

\*\*Number of tests

### SPRING WHEAT

Generally spring wheat in Ontario is much lower yielding than winter wheat, oats and barley. For those farmers, however, who choose to grow any spring wheat, the variety **Manitou** is available. **MANITOU** — Awnless, white chaff, red grain. Resistant to stem and leaf rust, and loose smut. Susceptible to mildew. Good lodging resistance.

### WINTER GRAINS

For good winter survival, seed early enough to obtain adequate top growth and root development in the autumn. This is particularly important for winter barley.

### WINTER WHEAT

#### Recommendations

GENESEE  
TALBOT  
YORKSTAR

All areas in Ontario suitable for winter wheat



### Winter Wheat Variety Descriptions

| Variety  | Bushel Weight | Lodging Resistance | Height | Winter Survival | Reaction to Disease* | Disease* |
|----------|---------------|--------------------|--------|-----------------|----------------------|----------|
|          |               |                    |        |                 | Loose Smut           | Rust     |
| GENESEE  | High          | Medium             | Tall   | Medium          | MR                   | S        |
| TALBOT   | High          | Medium to good     | Tall   | Medium          | MR                   | S        |
| YORKSTAR | Medium to low | Medium to good     | Medium | Medium          | MR                   | S        |

\*See Disease and Insect Control Recommendations, Page 38.

MR = moderately resistant; S = susceptible

### Winter Wheat Variety Yields\* — cwt/acre

| Variety  | Test Area  |            |             |
|----------|------------|------------|-------------|
|          | I<br>(9)** | II<br>(13) | III<br>(12) |
| Genesee  | 38         | 35         | 36          |
| Talbot   | 37         | 36         | 37          |
| Yorkstar | 41         | 37         | 38          |

\*Five-year average (1966-70)

\*\*Number of tests

**YORKSTAR:** Because of its genetic makeup, Yorkstar has a lower bushel weight than Genesee. Under unfavorable growing conditions bushel weight of Yorkstar could be low enough to cause downgrading when marked as a milling wheat.

## WINTER BARLEY

### Recommendations

**DOVER** — Areas south of the 2700-heat-unit line where winter barley can be expected to survive. Winter barley is not as winter-hardy as winter wheat.

**DOVER** — Strong, short-strawed, high yield, good threshability. Very early maturity. Six-rowed and rough-awned. Susceptible to loose smut, resistant to mildew.

## WINTER RYE

### Recommendations

**TETRA PETKUS** — For areas with more than 2300-heat-unit ratings. Tetra Petkus should not be grown in close proximity to common rye as the two cross to give sterility and lowered yields.

**IMPERIAL** — For areas between the 2300- and 1900-heat-unit lines.

**IMPERIAL** — Winter-hardy, weak-strawed variety of common rye with light-colored kernels. Pedigreed seed supplies limited.

**TETRA PETKUS** — A tetraploid variety with strong straw and large kernels. Ontario tests show this variety to be a high-yielding grain or green-manure crop. It is more winter-hardy than winter wheat but less winter-hardy than Imperial.

## Fertilizers for Grain Crops

### (not seeded down)

Fertilizer for cereal crops should be applied in the drill row with a combination fertilizer drill, or with a fertilizer attachment on the drill.

Fertilizer needs of grain crops should be determined from a soil test. The fertilizer rates suggested from soil tests are designed to produce highest economic yields when accompanied by good or above-average management. The following general

fertilizer recommendations should be followed only when a soil test is not available.

Manure, if available, should be used for crops such as corn and forage that give greater response to manure than grain crops.

Where manure is applied reduce the fertilizer recommendation according to the amount and quality of manure applied (see Page 51).

#### FERTILIZERS FOR GRAIN CROPS (not seeded down)

| Crop                             | Conditions   | Soil                 | Recommended Plant Food<br>(lb per acre) |      |      | Ratio | Suggested<br>Recommendation<br>Analysis |  | Rate |
|----------------------------------|--|----------------------|---|------|------|-------|---|--|------|
|                                  |  |                      | N                                       | P.O. | K.O. |       | Analysis                                |  |      |
| Spring Barley                    | - Following a crop of less than quarter legumes    | Sandy, Loamy or Clay | 30                                      | 30   | 30   | 1-1-1 | 15-15-15                                |  | 200  |
|                                  | If preceding crop contains quarter to half legumes | Sandy, Loamy or Clay | 8                                       | 30   | 30   | 1-4-4 | 6-24-24                                 |  | 150  |
|                                  | If preceding crop contains more than half legumes  | Sandy, Loamy or Clay | 0                                       | 30   | 30   | 0-1-1 | 0-20-20                                 |  | 150  |
| Oats and Mixed-Grain             | - Following a crop of less than quarter legumes    | Sandy, Loamy or Clay | 20                                      | 20   | 20   | 1-1-1 | 15-15-15                                |  | 150  |
|                                  | - Following legume sod OR                          | Sandy or Loamy       | 0                                       | 20   | 20   | 0-1-1 | 0-20-20                                 |  | 100  |
|                                  | - Where lodging may be a problem                   | Clay                 | 0                                       | 20   | 0    | 0-1-0 | 0-20-0                                  |  | 100  |
|                                  |  |                      |   |      |      |       |   |  |      |
| Winter Wheat, Rye, Winter Barley | - Where previous crop is not a legume sod*         | Sandy, Loamy or Clay | 15                                      | 60   | 30   | 1-2-4 | 8-32-16                                 |  | 200  |
|                                  | - Where lodging may be a problem OR                | Sandy, Loamy or Clay | 0                                       | 60   | 30   | 0-2-1 | 0-20-10                                 |  | 300  |
|                                  | - Where previous crop is a legume sod              |                      |   |      |      |       |   |  |      |

\* Where the crop does not follow a legume sod, apply 40 lb N per acre, e.g., ammonium nitrate at 120 lb per acre, as a topdressing in the early spring before growth begins. If nitrogen cannot be applied in early spring, apply 60 lb per acre in the late fall prior to freeze-up, e.g., ammonium nitrate at 180 lb per acre. The larger amount is required as fall applications are less effective than spring applications.

# Disease and Insect Control in Grain Crops

(See also Pages 54 to 55)

## DISEASES

**OAT NEMATODES.** If oat nematodes have caused damage the preceding crop year, do not plant oats or barley (see Publication 453, *The Oat Nematode in Ontario*). Use legume or row crops in the rotation. Corn may be used in the rotation when the nematode population is low but it will suffer damage the first year if the soil is heavily infested. The nematode invades but cannot reproduce in corn roots, thus successive cropping to corn effectively reduces the nematode population.

**FUSARIUM HEAD BLIGHT (Scab), CERCOSPORELLA FOOT ROT and TAKE ALL** in wheat are a threat in some seasons. Serious damage will be prevented by including one or more of alfalfa, clovers, soybeans, field beans, swede turnips, or oats, in the rotation. Do not grow wheat after wheat, barley, or corn. Plow down stubble and straw to cover all wheat and barley crop residues.

**CEREAL RUSTS** can be controlled to reduce grain losses. If you regularly have a rust problem on your grain, it is very likely there are common barberry or European buckthorn shrubs close by. These shrubs are hosts of the rust-producing organisms in part of their annual life cycle.

Common barberry is a 6- to 10-foot shrub with three-pronged spines on the stems, saw-toothed edges on the leaves and oblong red berries which hang on the plant through the fall and winter. It is a host for the **stem rust** fungi.

European buckthorn is a shrub or small tree with dark green leaves and round black berries. The leaves hang on till late in the fall and the berries remain most of the winter. It is a host for **leaf rust** fungi.

Rust losses commonly are greatest downwind from the shrubs. At times rust spores are blown in from the United States. Border states, except New York, have eradication programs like that of Ontario.

If rust is a problem on your farm, search out and kill these bushes and advise your County Weed Inspector or Agricultural Representative so that adjacent areas can be checked. Consult Publication 49, **Rid Ontario of Common Barberry and European Buckthorn**.

**SEED TREATMENT\***. The following diseases in cereal crops can be controlled by seed treatments.

**COVERED SMUT and SEEDLING BLIGHT** in barley

\* See Ontario Department of Agriculture and Food Publication 252, *Chemicals for Seed Treatment of Small Grains, for trade names of chemicals, and Publication 524, Smut Diseases of Grain Crops, for details of treatment*.

**COMMON BUNT, FUSARIUM BLIGHT and SEEDLING BLIGHT** in wheat

**COVERED SMUT and LOOSE SMUT** in oats  
**SEEDLING BLIGHT** in rye

All cereal seed should be cleaned and treated with a seed dressing. See Page 54 for precautions to take when preparing and using seed dressings.

**ORGANIC MERCURY SEED DRESSINGS.** Cereal seed treated with organic mercury fungicides may be used for spring planting in 1971. There may be new regulations limiting the use of mercury fungicides for treating cereal seed to be planted in the fall of 1971. Extreme precautions must be taken to prevent animals from accidentally eating treated seed grain. Consult Page 54 about the dangers of mercurial and other seed treatments and precautions to take when preparing and using them.

**NON-MERCURIAL SEED DRESSINGS.** Non-mercurial seed dressings are also available, primarily as drill-box formulations. Treat seed with one of:

Agrox N-M  
Green Cross Res Q  
Polyram  
Vitavax (not effective for seedling blights)

The following diseases may be controlled by the treatments indicated.

**LOOSE SMUT** in barley and wheat. Sow registered seed (which has a low smut count by embryo test) of a resistant variety, and treat seed with Vitavax at 4 oz per 100 lb seed. Vitavax also controls loose smut in susceptible varieties if properly applied.

The anaerobic treatment will also reduce loose smut infestation in seed. Directions for an anaerobic treatment: soak the seed in water for two hours at approximately 76°F. After soaking, drain off water and place seed in a closed container (milk can or plastic bag) for 65 hours at 76° to 80°F. It is essential that these temperature limits be observed. After treatment, spread out the seeds in a thin layer to dry enough to run through a drill. Treated seed can be kept for several weeks, provided it is dried thoroughly.

**COMMON BUNT** in wheat can be controlled also by treating seed with hexachlorobenzene seed dressing. This is less hazardous to apply under farm conditions than a mercury preparation.

**DWARF BUNT** in wheat, where it is seed-borne, can be controlled by treating seed with Vitavax. There is a possibility that Vitavax is effective also against soil-borne dwarf bunt.

## INSECTS

**WIREWORMS** damage cereal crops in certain areas every year. Injury is usually most severe in the two years following grass sod. As a precautionary measure, treat all grain seed with 50% lindane wettable powder, at one ounce per bushel in combination with an organic mercurial or non-mercurial fungicide according to directions on the label. Add the correct amount of fungicide and insecticide to one-half pint of water for each bushel to be treated. When treating, pour the water in slowly while mixing and do a thorough job of wetting all of the seed. Commercial seed treatment gives thorough coverage, but mixing can also be done in a cement mixer or by thorough hand shovelling. The dry powder can be mixed with the seed but this may result in inadequate coverage. Drill-box formulations are available.

Consult Page 54 about the dangers and precautions to follow when preparing and using mercurial and other seed treatments.

**ARMYWORMS.** Apply a spray at time of outbreak.

| Insecticide Formulation**                 | Rate/acre                 |
|---|---------------------------|
| carbaryl (Sevin) 50% WP<br>80 to 85% WP   | 2 lb<br>$1\frac{1}{4}$ lb |
| malathion 25% WP<br>50% EC (5 lb per gal) | 6 lb<br>$1\frac{1}{4}$ qt |
| Methoxychlor 50% WP<br>24% EC             | 3 lb<br>$2\frac{1}{2}$ qt |
| *parathion 15% WP                         | 2 lb                      |

\*Observe extreme safety precautions

\*\*EC—Emulsifiable Concentrate; WP—Wettable Powder

**CEREAL LEAF BEETLE.** The presence of this insect in much of southwestern Ontario has made necessary the enforcement of certain regulations to prevent the spread of this pest. Growers contemplating the sale of small grains, shelled or ear corn, hay and straw, to buyers north of a line between Sault Ste. Marie and Mattawa should inquire at an office of the Plant Protection Division (Canada Department of Agriculture) in Windsor, London, Niagara Falls, Guelph, Toronto or Ottawa.

Watch for and report damage by this insect in oats, wheat and barley to your Agricultural Representative or Soils and Crops Specialist.



GRAIN

## CHEMICAL WEED CONTROL IN GRAINS

Always read and follow the instructions which the manufacturer has printed on the herbicide label. This will give you further information on how to apply the chemicals and on conditions which will affect results. This can save you money and help prevent crop damage.

| Wheat, Oats,<br>Barley                   | Weed Situation  | Chemical  | Rate per Acre<br>Active Ingredient | Remarks   |
|--|---|---|------------------------------------|---|
| Not Under-seeded to Forage Crops         | Broadleaf weeds such as mustard, lamb's-quarters, ragweed, pigweed                              | 2,4-D (Amine)<br>MCPA (Amine)                         | Not over 8 oz<br>Not over 12 oz    | Apply the treatment when the crop is in the 2- to 5-leaf stage of growth. Early treatment is preferable. Treat winter wheat and winter barley in the spring. Oats are less susceptible to injury from <b>MCPA</b> than <b>2,4-D</b> and <b>MCPA</b> may be used safely at an earlier stage of growth.   |
|  | Many broadleaf weeds including smartweed and wild buckwheat                                     | Bromoxynil  | 6 oz                               | Since <b>Bromoxynil</b> moves very little within the plant, it is necessary to cover the weeds thoroughly with the spray. At least 20 gal water per acre should be used when the weeds are in the 4-leaf stage or partly covered by the cereal leaves. <b>Bromoxynil</b> should not be used after the 5-leaf stage of cereal development.   |
|  | Many broadleaf weeds including wild buckwheat   | Dichloroprop<br>+<br>2,4-D                            | 16 oz                              | Apply to emerged weeds when the cereals are in the 3- to 5-leaf stage of growth. For wheat and barley only. Sold as <b>Estraprop</b> , a 1:1 mixture of Dichloroprop and <b>2,4-D</b> .   |
|  | Many broadleaf weeds including smartweed, field bindweed, Canada thistle, perennial sow thistle | Commercial mixture of<br>Dicamba<br>2,4-D<br>Mecoprop | Not over 8 oz<br>(total acids)     | Sold as <b>Banvel 3</b> or <b>Kil-Mor</b> . For oats or wheat apply not more than 8 oz (total acids per acre) when the crop is in the 3- to 5-leaf stage of growth. Use not more than 6 oz (total acids per acre) when barley is in the 2- to 3-leaf stage of growth. Not registered for use on winter wheat, winter barley or malting barley.  |
| Canada thistle and perennial sow thistle |   | 2,4-DB<br>MCPB-MCPA<br>(15:1 mixture)                 | 16 to 20 oz<br>16 to 20 oz         | Treat the crop at the 2- to 5-leaf stage of growth when the weeds are fully emerged and before flowering. Many other broadleaf weeds will be controlled. The mixture of <b>MCPB</b> and <b>MCPA</b> (15:1) should be used where common mustard is a problem. <b>2,4-DB</b> will kill mustard only if applied before the mustard is taller than 2 inches. These herbicides should be applied in 15 to 20 gal water per acre. |

|   |  |                  |           |   |
|---|--|------------------|-----------|---|
| <b>Not Under-seeded to Forage Crops</b> | Wild oats in spring, barley and spring wheat | Barban (Carbyne) | 4 to 6 oz | Barban should be applied when the majority of the wild oats are in the 2-leaf stage. Use at least 50 psi, and 4 to 10 gal water per acre. |
|---|--|------------------|-----------|---|

|   |                       |                       |  |   |
|---|-----------------------|-----------------------|--|---|
| Quack grass, milkweed, Amitrol T and Canada thistle | Triallate (Avadex BW) | 1½ lb                 | 1.5 gal (product)  | Triallate must be worked into the soil to kill wild oats. This incorporation can be accomplished with a disk or harrow before planting or with a harrow after planting and should be done within 2 hours after application of the chemical. |
| Quack grass   | Dalapon               | 10 to 15 lb (product) | Apply after harvest to actively growing quack grass, milkweed, or Canada thistle foliage. Wait at least 10 days before working the area. | Apply in the fall to actively growing foliage. Wait at least 3 days before working the area.  |

## PEAS AND FIELD BEANS

(See Heat Unit Map on Page 6)

### FIELD PEAS

#### Variety Recommendations

CENTURY  
CHANCELLOR

} —Areas north of the 2900-heat-unit line.

**CHANCELLOR** — Small, smooth, yellow peas of good quality for soup or protein supplement for feeding. Flowers white, mature midseason.

**CENTURY** — Seed medium size, smooth and rounded, yellow, used for soup either whole or split. Flowers white, matures midseason (same as Chancellor).

### FIELD BEANS

#### Variety and Planting Date Recommendations

|          | 2600-2900<br>heat units | 2900-3100<br>heat units | 3100 or more<br>heat units |
|----------|-------------------------|-------------------------|----------------------------|
| Seaway   | June 1-10               | June 5-15               | June 15-25                 |
| Seafarer | June 1-10               | June 5-15               | June 15-25                 |
| Sanilac  | June 1-5                | June 5-10               | June 10-20                 |

Choose a variety that will mature every year in your heat unit area.

#### Field Bean Variety Descriptions

| Plant<br>Type | Yield*<br>cwt/acre @<br>18% Moisture | Days To*<br>Maturity | Reaction To Disease** |             |
|---------------|--------------------------------------|----------------------|-----------------------|-------------|
|               |                                      |                      | Mosaic                | Anthracnose |
| Seaway        | 20.0                                 | 92                   | R                     | S           |
| Seafarer      | 19.9                                 | 91                   | R                     | R           |
| Sanilac       | 20.8                                 | 95                   | MR                    | R           |

\*Yields and maturity figures were obtained by averaging 12 tests from 1968-70 that were conducted by Harrow Research Station, Ridgetown College of Agricultural Technology, and Kemptville College of Agricultural Technology.

\*\*S = Susceptible; R = Resistant; MR = Moderately Resistant

**Row widths** of 24 to 28 inches are standard because of the nature of the harvesting equipment. **Plant 5 or 6 seeds** per foot of row (35 to 40 lb) in 28-inch rows or the equivalent seeding rate in 24-inch rows for best results with a minimum of disease problems.

**Steuben** is a yellow eye bean variety that is adapted to areas of 3100 heat units or more. It is a bush type and is susceptible to the common strains of bean mosaic and anthracnose.

#### Fertilizers for Field Peas and Beans

Fertilizer needs of the pea and bean crops should be determined from a soil test. The following general fertilizer recommendations should be followed only when a soil test report is not available.

**Pea and bean seedlings are easily damaged by direct contact with fertilizer. The fertilizer may be broadcast and plowed down or worked in before planting, or a planter with a separate shoe for fertilizer placement may be used to place the fertilizer 2 inches to the side and 2 inches below the seed.**

- On sandy or loamy soils use 15 lb N, 60 lb P<sub>2</sub>O<sub>5</sub>, 60 lb K<sub>2</sub>O per acre, e.g. 6-24-24 (a 1-4-4 ratio), at 250 lb per acre.
- On clay soils use 15 lb N, 60 lb P<sub>2</sub>O<sub>5</sub>, 30 lb K<sub>2</sub>O per acre, e.g. 8-32-16 (a 1-4-2 ratio), at 200 lb per acre.
- Where manure is applied reduce the total fertilizer application by one-third. After a legume sod use 0-20-20 (a 0-1-1 ratio) on sandy and loamy soils, and 0-20-10 (a 0-2-1 ratio) on clay soils at 300 lb per acre.

## Disease and Insect Control in Field Beans

(See also Pages 54 to 55)

**SEED TREATMENTS** containing diazinon, lindane and a fungicide are required to protect large seeded crops from **SEED MAGGOTS, WIREWORMS** and **SEED-DECAY ORGANISMS**.

**APPLICATION OF THE INSECTICIDES ALONE MAY RESULT IN REDUCED GERMINATION.** Diazinon is used to control seed maggots; lindane to control wireworms. The combination seed treatment should be applied every year because maggots are usually an annual pest and the kill of the wireworm seldom is high.

Because of changes in pesticide regulations all seed will have to be treated for root maggot, wireworm and seed-decay control. If your local dealer does not treat, use a planter-box formulation, and dry-treat the seed when planting. These combinations of diazinon and lindane are available from seed suppliers in individual containers for one bushel lots of seed. Directions stated on the container should be followed with care; the mixing in the planter box must be thorough or germination will be reduced and insect control will be poor. For your protection while mixing, use rubber gloves and a wooden paddle and avoid breathing dust stirred up while the mixing is in progress.

## DISEASES

**ANTHRACNOSE** and **BACTERIAL BLIGHT** are persistent diseases against which a continual fight must be waged. To keep them from building up, follow a 2- to 5-year rotation; do not apply manure containing bean refuse to land intended for beans; do not plant seed which has been harvested from diseased plants; and stay out of fields when foliage is wet.

**WHITE MOLD** (*Sclerotinia*) usually occurs after August 15 in fields where dew never completely evaporates from plants. This is caused by poor air circulation. Where the disease is a problem, use bush-type varieties and reduced seeding rates (never more than 5 to 6 seeds per planted foot). The fungus is widespread and crop rotation may not give much control.

## INSECTS

**MEXICAN BEAN BEETLES** and **POTATO LEAF-**

**HOPPERS** cause severe damage some years. Growers should treat their plants when insects appear. Two or at the most three treatments will be adequate.

The following treatments will control both insects.

| Insecticide                   | Formulation            | Rate per Acre                |
|-------------------------------|------------------------|------------------------------|
| carbaryl (Sevin)              | 50% WP<br>80 or 85% WP | 1 to 2 lb*<br>¾ to 1-1/5 lb* |
| azinphos-methyl<br>(Guthion)  | EC                     | 1-2/3 pts                    |
| **endosulfan<br>(Thiodan)     | 4EC                    | 1 pt                         |
| **dimethoate<br>Cyon<br>Rogor | 4E<br>40% }            | ½ to ¾ pt                    |
| malathion                     | 25% WP                 | 4 lb                         |

\*Use lower rate for Mexican Bean Beetle

\*\*Do not use stover for feed or bedding

**Granular Treatment** at planting time for both insects: disulfoton (Di-Syston) 15% granular, 7 lb; phorate (Thimet) 10% granular, 10 lb. Application must be at least 60 days before harvest.

**GREEN CLOVERWORM** appears some years as green worms (loopers) feeding on bean foliage, causing holes in leaves and reducing yield. Shake worms from plants onto paper to count them. If more than five caterpillars are found per foot of row, spray with one of:

| Insecticide                   | Formulation  | Rate per Acre  |
|-------------------------------|--------------|----------------|
| carbaryl (Sevin)              | 80 or 85% WP | 1 ¼ lb         |
| *azinphos-methyl<br>(Guthion) | 50% WP<br>EC | 1 lb<br>1 ½ pt |

\*30-day waiting period to harvest. Do not use stover for feed or bedding.

# CHEMICAL WEED CONTROL IN FIELD BEANS

Always read and follow the instructions which the manufacturer has printed on the herbicide label. This will give you further information on how to apply the chemical and on conditions which will affect results. This can save you money and help prevent crop damage.

| Weed Situation                                 | Chemical   | Rate per Acre<br>Active Ingredient            | Applied as                                | Remarks  |
|--|--|---|---|--|
| Germinating common annual broadleaf weeds*     | Metobromuron (Patoran)                               | 1 to 1½ lb                                    | Premergence                               | Use the lower rate on light-textured soils. Do not use on sandy soils of less than 2% organic matter. Sow beans at least 1½ inches deep. Rotary hoe if dry weather follows the application.  |
| Germinating annual grasses, nut sedge          | EPTC (EPTAM)   | 2 to 3 lb                                     | Preplant-incorporated                     | EPTC (EPTAM) should be applied to a dry soil surface before planting and incorporated within 10 minutes with a double disk set to a depth of 4 inches or a Triple K type cultivator (vibrating cultivation). A second disking should be done at right angles in tandem with a harrow. Use 2 to 3 lb on sandy soils and 3 lb on clay soils. If dry weather has preceded the application of EPTC, delay seeding 7 to 10 days. Application to a moist soil surface has been ineffective. Temporary injury can occur in the emerging crop. |
| Germinating annual grasses                     | Trifluralin (Treflan)                                | ½ to 1 lb                                     | Preplant-incorporated                     | Treflan must be applied before planting and incorporated immediately with a double disk and harrow in tandem. Disking should be done to a depth of 4 inches in two directions at right angles to one another. Use the higher rate on clay soil and the lower rate on sand. Black nightshade and ragweed are not controlled and mustard and smartweed may escape.   |
| Germinating annual broadleaf weeds and grasses | Chloramben (Amiben)                                  | 2 lb (sandy soils)<br>or<br>3 lb (clay soils) | Premergence                               | Controls most annual broadleaf weeds and grasses with the exception of mustards. Weed control will last for at least 8 weeks. Delayed maturity may occur if heavy rainfall follows application. Rotary hoe if dry weather follows the application.   |
| Quack grass                                    | Trifluralin (Treflan)<br>+<br>Metobromuron (Patoran) | ½ to 1 lb<br>+<br>¾ to 1 lb                   | Preplant-incorporated<br>+<br>Premergence | See above for each chemical.   |
|  | EPTC (EPTAM)<br>+<br>Metobromuron (Patoran)          | 2 to 3 lb<br>+<br>¾ to 1 lb                   | Preplant-incorporated<br>+<br>Premergence | See above for each chemical.   |
|  | Amitrole T   | 2 to 3 lb                                     | Before planting                           | Apply in the fall or spring to actively growing quack beans on grow-grass foliage. Wait 10 to 14 days before plowing or ing quack grass disking; beans can then be planted. Row cultivation may be required.   |

\* Common annual broadleaf weeds include ragweed, pigweed, lamb's-quarters, and mustards. (See exceptions listed under remarks.)

## FIELD BEAN HERBICIDE WEED CONTROL RATINGS

This chart is intended to help in the selection of a herbicide to control specific weeds. For complete information refer to remarks given for each chemical on the preceding pages.

The chemical ratings in this chart give general comparisons based on use as described in this publication. In unfavorable conditions (e.g. too dry, too wet, too cold, and poor spray job) the herbicides may not be as effective as shown in the chart.

| Weed Control Rating<br>E — excellent<br>G — good<br>F — fair<br>P — poor   | ACTIVE CHEMICAL<br>PER ACRE                             | ANNUAL BROADLEAVES |              |                 |          |                   |          |          |            |                |            | ANNUAL GRASSES |         |                 |                 | PERENNIALS |          |           |             | BEAN TOLERANCE |                 |
|--|---|--------------------|--------------|-----------------|----------|-------------------|----------|----------|------------|----------------|------------|----------------|---------|-----------------|-----------------|------------|----------|-----------|-------------|----------------|-----------------|
|  |   | buckwheat, wild    | lady's-thumb | lamb's-quarters | mustards | nightshade, black | pigweeds | ragweeds | velvetleaf | barnyard grass | crab grass | fall panicum   | foxtail | old witch grass | bindweed, field | horsetail  | milkweed | nut sedge | quack grass | sow thistle    | thistle, Canada |
| PREPLANT<br>Amitrole (Amitrole T,<br>Cytrol) 2-3 lb  |   | *                  | *            | *               | *        | *                 | *        | *        | *          | *              | *          | *              | *       | *               | *               | *          | *        | G         | E           | G              | G               |
| PREPLANT INCORP.<br>EPTC (EPTAM) 2-3 lb  | F F G P F F F E E E E E P F P E P P P P P P E P P P P E |                    |              |                 |          |                   |          |          |            |                |            |                |         |                 |                 |            |          |           |             |                |                 |
| Trifluralin<br>(Treflan) $\frac{1}{2}$ -1 lb   | F F F P P F P E E G E E P P P P P P P P P P P P P E     |                    |              |                 |          |                   |          |          |            |                |            |                |         |                 |                 |            |          |           |             |                |                 |
| SPLIT APPLICATION<br>Trifluralin (Treflan)<br>$\frac{1}{2}$ -1 lb + Meto-<br>bromuron (Patoran)<br>$\frac{3}{4}$ -1 lb | E E E E G E E F E E G E E P P P P P P P P P P P P G     |                    |              |                 |          |                   |          |          |            |                |            |                |         |                 |                 |            |          |           |             |                |                 |
| EPTC (Eptam) 2-3 lb<br>+ Metobromuron<br>(Patoran) $\frac{3}{4}$ -1 lb   | E E E E G E E F E E G E E P F P E P P P P P P G         |                    |              |                 |          |                   |          |          |            |                |            |                |         |                 |                 |            |          |           |             |                |                 |
| PREEMERGENCE<br>Chloramben (Amiben)<br>2-3 lb  | G G G F F E G F G F P F G P P P P P P P P P P F         |                    |              |                 |          |                   |          |          |            |                |            |                |         |                 |                 |            |          |           |             |                |                 |
| Metobromuron<br>(Patoran) 1-1½ lb  | E E E E G E E F F F F G G P P P P P P P P P P G         |                    |              |                 |          |                   |          |          |            |                |            |                |         |                 |                 |            |          |           |             |                |                 |

\*Amitrole cannot be used effectively to control these weeds in the field bean crop, but it may be used to control all weeds after harvest.

# SOYBEANS

## Variety Recommendations

Choose a variety that will mature every year in your locality.

When you intend to sow fall wheat following a soybean crop, choose a variety that requires 300 heat units less than those available in your area.

| Variety     | Heat Units*<br>Required | Recommended<br>Row Width |
|-------------|-------------------------|--------------------------|
| ALTONA      | 2500                    | 28" OR LESS              |
| MERIT       | 2600                    | 28" OR LESS              |
| HARDOME     | 2700                    | 28" OR LESS              |
| CHIPPEWA 64 | 2800                    | 28" OR LESS              |
| HAROSOY 63  | 3100                    | 28" OR LESS              |
| BEESON      | 3200                    | 28" OR LESS              |

\*See heat unit map, Page 6.

## Variety Descriptions

| Variety     | Heat Units<br>Required | Color  |            |             | Seeds/<br>Pound | Reaction to<br>Phytophthora<br>Root Rot* |
|-------------|------------------------|--------|------------|-------------|-----------------|--|
|             |                        | Flower | Pubescence | Hilum       |                 |  |
| Altona      | 2450                   | Purple | Brown      | Black       | 2400            | R  |
| Merit       | 2650                   | White  | Gray       | Buff        | 3000            | R  |
| Hardome     | 2700                   | Purple | Gray       | Gray        | 2700            | S  |
| Chippewa 64 | 2800                   | Purple | Brown      | Black       | 2900            | R  |
| Harosoy 63  | 3100                   | Purple | Gray       | Yellow      | 2600            | R  |
| Beeson      | 3200                   | Purple | Gray       | Brown-Black | 2500            | R  |

\*R = Resistant; S = Susceptible

## AGRONOMIC DATA 2500 — 2900 HEAT UNIT AREA

Three-year average of 10 trials located in Ottawa, Kemptville, Smithfield, and Elora

| Variety | Heat<br>Unit<br>Rating | Yield<br>Bushels/Acre<br>14% Moisture | Days From<br>Planting<br>To Maturity | Plant<br>Height<br>Inches | Lodging<br>1 = None<br>5 = All |
|---------|------------------------|---------------------------------------|--------------------------------------|---------------------------|--------------------------------|
| Altona  | 2450                   | 38                                    | 117                                  | 32                        | 2.2                            |
| Merit   | 2650                   | 41                                    | 126                                  | 37                        | 2.3                            |
| Hardome | 2700                   | 40                                    | 129                                  | 40                        | 3.1                            |

## AGRONOMIC DATA 3000 — 3400 HEAT UNIT AREA

Three-year average of 11 trials located in Ridgetown, Oil Springs, Woodslee, and Harrow

| Variety     | Heat Unit Rating | Yield Bushel/Acre<br>14% Moisture | Days From Planting To Maturity | Plant Height Inches | Lodging<br>1 = None<br>5 = All |
|-------------|------------------|-----------------------------------|--------------------------------|---------------------|--------------------------------|
| Altona      | 2450             | 38                                | 103                            | 31                  | 2.2                            |
| Merit       | 2650             | 42                                | 110                            | 37                  | 1.8                            |
| Hardome     | 2700             | 42                                | 111                            | 40                  | 2.8                            |
| Chippewa 64 | 2800             | 41                                | 115                            | 38                  | 2.0                            |
| Harosoy 63  | 3100             | 46                                | 122                            | 45                  | 2.8                            |
| Beeson      | 3200             | 49                                | 125                            | 42                  | 2.6                            |

### Planting Recommendations

Make allowance for variety seed size difference. One bushel (60 pounds) per acre seeding rate is adequate for most varieties in 14- to 28-inch rows. Adjust seeding rate upward for lower germination or for soils which crust

badly. Uniform depth of seeding at 1 to 2 inches is important. Soybeans should be planted the last 10 days of May (May 20 - May 30).

| Row Width | Lb/Acre | Seed Drop per Foot of Row<br>(2,400 seeds/lb — 3,000 seeds/lb) |
|-----------|---------|--|
| 28        | 60      | 8 - 10   |
| 21        | 60      | 6 - 8  |
| 14        | 60      | 4 - 5  |

### Fertilizers for Soybeans

Soybeans will produce highest yields where other crops in the rotation have been well fertilized. Soybeans should be inoculated each time the crop is planted.

**Fertilizer needs of the soybean crop should be determined from a soil test. The following general fertilizer recommendations should be followed only when a soil test report is not available.**

Bean seedlings are easily damaged by direct contact with fertilizer. The fertilizer may be broadcast and plowed down or worked in before planting, or a planter with a separate shoe for fertilizer placement may be used to place the fertilizer 2 inches to the side and 2 inches below the seed.

On sandy or loamy soils use 10 lb N, 40 lb P<sub>2</sub>O<sub>5</sub>, 40 lb K<sub>2</sub>O per acre, e.g. 6-24-24 (a 1-4-4 ratio), at 175 lb per acre.

On clay soils use 10 lb N, 40 lb P<sub>2</sub>O<sub>5</sub>, 20 lb K<sub>2</sub>O per acre, e.g. 8-32-16 (a 1-4-2 ratio), at 125 lb per acre.

**MANGANESE DEFICIENCY** occurs frequently in soybeans. The upper leaves range from pale green (slight deficiency) to almost white (severe deficiency) while the veins remain green.

Correct the deficiency as soon as detected, by spraying with 6 to 8 lb manganese sulfate in 20 or more gallons water per acre. Use a "spreader sticker" (such as Tween 20) in the spray. If the deficiency is severe, a second spray may be beneficial.

Never use spray equipment which has been used for spraying hormone-type herbicides such as 2,4-D. Beans are very sensitive to this type of herbicide.

### Disease and Insect Control in Soybeans

(See also Pages 54 to 55)

#### SEED TREATMENT

See Seed Treatment under Field Beans on Page 43. When planting soybeans in an area for the first time, omit the seed treatment. Seed treatment chemicals may be

too toxic for the inoculant and poor inoculation can result. Poor inoculation cannot be accepted where high yields are being sought.

#### PLANTING

On clay soils where **PHYTOPHTHORA ROOT ROT** is a problem, and a suitable resistant variety is not avail-

able, deep seedbed preparation by plowing rather than diskng will minimize losses due to this disease.

## CHEMICAL WEED CONTROL IN SOYBEANS

Always read and follow the instructions which the manufacturer has printed on the herbicide label. This will give you further information on how to apply the chemical and on conditions which will affect results. This can save you money and help prevent crop damage.

| Weed Situation                                 | Chemical                                     | Active Ingredient              | Rate per Acre         | Applied As  | Remarks |
|--|--|--------------------------------|-----------------------|---|---------|
| Germinating common broadleaf annual weeds*     | Linuron                                      | 1 to 2 lb                      | Premergence           | Premergence treatments. Controls annual broadleaf weeds with a good margin of safety to the soybeans. Annual grasses may escape, therefore rotary hoeing or cultivation may be necessary. Use lower rates on light-textured soils and the 2-lb rate on clay soils only. Do not use on sandy soils of less than 2% organic matter. Beans should be seeded at least 1½ inches deep.   |         |
| Emerged annual broadleaf weeds                 | Chloroxuron (Tenoran) + Surfactant Adjuvan T | 1½ to 2 lb + 1 pt/25 gal water | Early postemergence   | Applied early postemergence before weeds reach a height of 1 to 2 inches and after the soybeans have formed true leaves. Will not control grasses. Temporary soybean injury will occur.   |         |
| Germinating annual grasses                     | Alachlor (Lasso)                             | 2 to 2½ lb                     | Premergence           | Premergence treatment. Controls annual grasses and black nightshade but does not control other annual broadleaf weeds.  |         |
| Trifluralin (Treflan)                          |  | ½ to 1 lb                      | Preplant Incorporated | Must be applied before planting and incorporated immediately with a double disk and harrow in tandem. Disk at a depth of 4 inches in two directions at right angles to one another. Use high rate on clay soil and lower rate on sand. Black nightshade and ragweed are not controlled and mustard and smartweed may escape.  |         |
| Germinating annual grasses, nut sedge          | Vernolate (Vernam)                           | 2 to 3 lb                      | Preplant-incorporated | <b>Vernam</b> should be applied to a dry soil surface before planting and incorporated within 10 minutes with a double disk set to a depth of 4 inches or a Triple K type cultivator (vibrating cultivation). A second disking should be done at right angles in tandem with a harrow. Use 2 to 3 lb on sandy soils and 3 lb on clay soils. Temporary injury may occur to the soybeans but yields are not usually affected. Ragweed is not controlled and mustard and smartweed may escape. |         |
| Terminating annual broadleaf weeds and grasses | Alachlor (Lasso) + Linuron                   | 2 lb + ¾ to 1 lb               | Premergence tank mix  | See above for each chemical.  |         |

|   |   |   |   |
|---|---|---|---|
| Alachlor<br>(Lasso)<br>+                    | 2 lb<br>+<br>$\frac{3}{4}$ to 1 lb                            | Premergence<br>tank mix                               | See above for each chemical.  |
| Metobromuron<br>(Patoran)                   |   |   |   |
| Chloramben<br>(Amiben)                      | 2 to 3 lb<br>(sandy soils)<br>or<br>3 to 4 lb<br>(clay soils) | Premergence   | Controls annual broadleaf weeds and grasses with an excellent margin of safety to the soybeans. Weeds with the exception of mustards will be controlled for at least eight weeks after application. |
| Linuron                                     | 1 to 1½ lb<br>+<br>2 to 3 lb                                  | Premergence as<br>commercial<br>formulated<br>mixture | Premergence in bands with row cultivation necessary to control weeds between rows. Sold as Londax, a commercial granular or wettable powder formulation. Effective on high organic matter soils.    |
| Propachlor<br>(Ramrod)                      |   |   |   |
| Limuron                                     | $\frac{1}{2}$ to 1 lb<br>+<br>$\frac{3}{4}$ to 1 lb           | Preat-<br>incorporated<br>+<br>Premergence            | See above for each chemical.  |
| Trifluralin<br>(Treflan)                    |   |   |   |
| Linuron                                     | $\frac{1}{2}$ to 1 lb<br>+<br>$\frac{3}{4}$ to 1 lb           | Preat-<br>incorporated<br>+<br>Premergence            | See above for each chemical.  |
| Trifluralin<br>(Treflan)                    |   |   |   |
| Metobromuron<br>(Patoran)                   |   |   |   |
| Trifluralin<br>(Treflan)                    | $\frac{1}{2}$ to 1 lb<br>+<br>1½ to 2 lb                      | Preat-<br>incorporated<br>+<br>Postemergence          | See above for each chemical.  |
| Chloroxuron<br>(Tenoram)<br>with surfactant |   |   |   |
| Quack grass                                 | Amitrole T  | 2 to 3 lb   | Before planting<br>beans on<br>growing<br>quack grass   |
|   |   |   | Apply in the fall or spring to actively growing quack grass foliage. Wait 10 to 14 days before plowing or disking. Beans can then be planted. Row cultivation may be required.                      |

\*Common annual broadleaf weeds include ragweed, pigweed, lamb's-quarters, and mustards. (See exceptions listed under remarks.)



## SOYBEAN HERBICIDE WEED CONTROL RATINGS

This chart is intended to help in the selection of a herbicide to control specific weeds. For complete information refer to remarks given for each chemical on the preceding pages.

The chemical ratings in this chart give general comparisons based on use as described in this publication. In unfavorable conditions (e.g. too dry, too wet, too cold, and poor spray job) the herbicides may not be as effective as shown in the chart.

| Weed Control Rating<br>E — excellent<br>G — good<br>F — fair<br>P — poor                       | ANNUAL BROADLEAVES |              |                 |          |                   |          |          | ANNUAL GRASSES |                |            |              | PERENNIALS |                |                 |           |          |           |   |   |
|--|--------------------|--------------|-----------------|----------|-------------------|----------|----------|----------------|----------------|------------|--------------|------------|----------------|-----------------|-----------|----------|-----------|---|---|
|  | buckwheat, wild    | lady's-thumb | lamb's-quarters | mustards | nightshade, black | pigweeds | ragweeds | velvetleaf     | barnyard grass | crab grass | fall panicum | foxtail    | old witchgrass | bindweed, field | horsetail | milkweed | nut sedge |   |   |
| ACTIVE CHEMICAL PER ACRE   |                    |              |                 |          |                   |          |          |                |                |            |              |            |                |                 |           |          |           |   |   |
| <b>PREPLANT</b>  |                    |              |                 |          |                   |          |          |                |                |            |              |            |                |                 |           |          |           |   |   |
| Amitrole (Amitrole T)<br>2-3 lb  | *                  | *            | *               | *        | *                 | *        | *        | *              | *              | *          | *            | *          | *              | *               | *         | G        | E         | G | G |
| <b>PREPLANT INCORP.</b>  |                    |              |                 |          |                   |          |          |                |                |            |              |            |                |                 |           |          |           |   |   |
| Trifluralin (Treflan) $\frac{1}{2}$ -1 lb  | F                  | F            | F               | P        | P                 | F        | P        | P              | E              | E          | G            | E          | E              | P               | P         | P        | P         | P | E |
| Vernolate (Vernam) 2-3 lb  | F                  | F            | F               | P        | P                 | F        | F        | P              | G              | E          | G            | E          | G              | P               | F         | P        | F         | P | G |
| <b>PREEMERGENCE</b>  |                    |              |                 |          |                   |          |          |                |                |            |              |            |                |                 |           |          |           |   |   |
| Alachlor (Lasso) 2 lb  | P                  | P            | F               | P        | G                 | G        | P        | P              | E              | E          | E            | E          | E              | P               | P         | P        | P         | P | G |
| Chloramben (Amiben) 2-3 lb   | E                  | E            | E               | F        | F                 | E        | G        | F              | G              | G          | F            | G          | G              | P               | P         | P        | P         | P | E |
| Linuron (Afalon,<br>Lorox) 1-2 lb  | E                  | E            | E               | E        | G                 | E        | E        | F              | F              | F          | F            | F          | F              | P               | P         | P        | P         | P | G |
| Metobromuron<br>(Patoran) 1-2 lb   | E                  | E            | E               | E        | G                 | E        | E        | F              | F              | F          | F            | F          | F              | P               | P         | P        | P         | P | G |
| Linuron 1-1½ lb +<br>Propachlor (Ramrod)<br>2-3 lb   | E                  | E            | E               | E        | G                 | E        | E        | F              | E              | E          | E            | E          | E              | P               | P         | P        | P         | P | G |
| Alachlor (Lasso)<br>2 lb + Metobromuron<br>(Patoran) $\frac{3}{4}$ -1 lb                       | E                  | E            | E               | E        | G                 | E        | E        | F              | E              | E          | E            | E          | E              | P               | P         | P        | P         | P | G |
| Alachlor (Lasso)<br>2 lb + Linuron<br>(Lorox, Afalon) $\frac{3}{4}$ -1 lb                      | E                  | E            | E               | E        | G                 | E        | E        | F              | E              | E          | E            | E          | E              | P               | P         | P        | P         | P | G |
| <b>SPLIT APPLICATION</b>   |                    |              |                 |          |                   |          |          |                |                |            |              |            |                |                 |           |          |           |   |   |
| Trifluralin (Treflan)<br>$\frac{1}{2}$ -1 lb + Meto-<br>bromuron (Patoran) $\frac{3}{4}$ -1 lb | E                  | E            | E               | E        | G                 | E        | E        | F              | E              | E          | G            | E          | E              | P               | P         | P        | P         | P | G |
| Trifluralin (Treflan)<br>$\frac{1}{2}$ -1 lb + Linuron (Lorox,<br>Afalon) $\frac{3}{4}$ -1 lb  | E                  | E            | E               | E        | G                 | E        | E        | F              | E              | E          | G            | E          | E              | P               | P         | P        | P         | P | G |
| <b>SOYBEANS &amp; WEEDS UP</b>   |                    |              |                 |          |                   |          |          |                |                |            |              |            |                |                 |           |          |           |   |   |
| Chloroxuron<br>(Tenoran) 1½-2 lb<br>+ Adjuvan-T  | G                  | G            | G               | G        | G                 | G        | G        | G              | P              | P          | P            | P          | P              | P               | P         | P        | P         | P | F |

\*Amitrole cannot be used effectively to control these weeds in the soybean crop, but it may be used to control all weeds after harvest.

# GENERAL INFORMATION FOR CROP PRODUCTION

## Soil Management And Fertilizer Use

Ontario currently uses more than 800,000 tons of commercial fertilizers annually and use continues to increase. Fertilizers are an integral part of crop production and in theory they could serve as the only source of nutrients for plants. In actual practice high yields can be produced efficiently only when fertilizer use is related to the fertility level of the soil and to other additions of nutrients in manure, crop residues, sewage sludge, etc. At one extreme, on very low fertility soils, it is occasionally profitable to add as much nitrogen, phosphorus or potassium in the fertilizer as a crop removes. At the other extreme, on high fertility soils or following heavy application of manures, commercial fertilizer may not be profitable, and occasionally may reduce yields.

**Specific fertilizer needs of field crops are best determined by a soil test and growers are strongly advised to take advantage of this service. The general recommendations for fertilizer applications which appear in this publication are intended only as a guide when soil tests are not available.**

Fertilizers do not eliminate the need for good soil management to maintain soil organic matter, tilth and aeration. Organic matter serves as a storehouse which releases plant nutrients slowly throughout the growing

season and also helps to maintain a suitable physical soil condition for root growth.

Soils are often grouped into sandy (coarse-textured) soils and clay (fine-textured) soils for purposes of fertilizer recommendations. Generally more nitrogen and potassium fertilizer is needed to maintain high levels of fertility in a sandy soil than in clay.

### Manure

Manure is a valuable waste resource on Ontario live-stock farms that should be used in crop production programs. The return of animal manures to the soil provides both biological and chemical benefits.

Manure should be used to supply some of the necessary plant food for crop production and can substitute for commercial fertilizers.

The largest portion of the plant food in animal feed (50 to 70% of the nitrogen, 70% of the phosphorus, and 85% of the potassium content) is excreted in manure.

The following table provides a guide to the plant food content of manure that is of direct benefit in the first crop year. An additional benefit to the soil is the portion of the plant food in manure that becomes available to succeeding crops.

Average Plant Food Content in Manure Available in First Crop Year

| Source           | Solid<br>Tons/Acre* | Liquid<br>Gallons/Acre | Direct Crop Benefit<br>(lb/Acre) |      |      |
|------------------|---------------------|------------------------|----------------------------------|------|------|
|                  |                     |                        | N                                | P.O. | K.O. |
| Pig, Beef, Dairy | 15                  | 6,000                  | 75                               | 30   | 90   |
| Poultry          | 5                   | 3,000                  | 75                               | 45   | 45   |

\* 60 bushels per ton

## FERTILIZER MATERIALS

Nitrogen fertilizer materials are available in dry or liquid forms. Which of these forms to use is a matter of choice for the individual farmer depending upon availability of the material, equipment for handling, and cost per pound of nitrogen, plus the cost of application.

A farmer should first calculate the cost per pound of nitrogen from various sources delivered to his farm. Depending on the rate of application, the cost per acre can be determined. Add to this the cost of application per acre before deciding on the nitrogen source to use.

Where separate additions of nitrogen are referred to in the recommendations, pounds of elemental nitrogen (N), not pounds of materials, are used. The following tables show the percentage of fertilizer nutrient contained in different materials.

### Nitrogen Materials                          % Nitrogen (N)\*

|                                     |        |       |
|-------------------------------------|--------|-------|
| Ammonium nitrate .....              | Dry    | 33-34 |
| Urea .....                          | Dry    | 45    |
| Ammonium Sulfate .....              | Dry    | 20    |
| Aqua Ammonium .....                 | Liquid | 20    |
| Ammonium Nitrate-Urea .....         | Liquid | 28    |
| Ammonium Nitrate-Urea .....         | Liquid | 32    |
| Ammonia-Ammonium Nitrate-Urea ..... | Liquid | 41    |
| Ammonium Nitrate-Ammonia .....      | Liquid | 38    |
| Anhydrous Ammonia .....             | Liquid | 82    |

### Phosphate Materials                          % Phosphate (P<sub>2</sub>O<sub>5</sub>)\*

|                                      |    |
|--------------------------------------|----|
| Superphosphate .....                 | 20 |
| Treble Superphosphate .....          | 46 |
| Ammonium Phosphate (13-52-0) .....   | 52 |
| Diammonium Phosphate (18-46-0) ..... | 46 |

### Potash Materials                          % Potash (K<sub>2</sub>O)\*

|  |    |
|--|----|
| Muriate of Potash .....                    | 60 |
| Sulfate of Potash .....                    | 48 |
| Sulfate of Potash-Magnesia (18% MgO) ..... | 22 |

\* Pounds of N, P<sub>2</sub>O<sub>5</sub>, or K<sub>2</sub>O supplied in 100 lb of material.

### SOIL TESTING

A soil test is the basis for a sound soil fertility program on Ontario farms.

Every effort should be made by the farmer to sample the soil from his fields at regular intervals (every two to three years) in order to maintain or increase his production and to obtain information on the most profitable use of commercial fertilizers.

Fertilizer recommendations based on soil test results are made by Agricultural Representatives, Fruit and Vegetable Specialists, and Soil and Crop Specialists, in County and District offices. Soil sample boxes and field information sheets are available from these offices. Management practices which affect a soil test recommendation are: manure application, straw or cornstalks plowed down, the kind of crop to be plowed down, and the crop to be fertilized. This information is important and should be recorded on the field information sheet which must accompany the soil sample sent in for analysis, before reliable fertilizer recommendations can be made.

The results of soil tests are forwarded to the County and District offices within two weeks of receipt of samples in the laboratory. However, to allow time for mailing and analysis, soil samples from fields to be fertilized for spring crops should be taken the previous fall.

Soil samples from fields to be fertilized for fall wheat or from hay and pasture fields to be fertilized in the fall should be taken in the spring or early summer.

Mail or express samples to the Department of Soil Science, Ontario Agricultural College, University of Guelph, Guelph, Ontario, where the soil analysis will be completed.

The soil test can:

- (1) indicate the kind and amount of lime required;
- (2) measure the soil nutrients available for crop production;
- (3) provide the basis for suggested rates of fertilizer application.

Fertilizers applied on the basis of soil test results do not remove the limitations placed on crop production by poor soil drainage, by adverse weather conditions such as moisture and temperature, by inadequate plant populations or poor choice of variety, by poor weed control programs or by insect damage.

## Alternative Methods of Supplying Fertilizer Requirements

The general recommendations for nitrogen, phosphorus, and potassium given for each crop can be applied using (1) mixed fertilizers or (2) mixed fertilizers and fertilizer materials or (3) fertilizer materials alone.

Below are examples of three possible ways of supplying the fertility requirements.

### Suggested Alternative Methods of Supplying Fertilizer Required (lb per acre)

| Crop                           | Crop Requirements |      |     | Mixed Fertilizers<br>(1)   | Mixed Fertilizers and Materials<br>(2)  | Materials<br>(3)   |
|--------------------------------|-------------------|------|-----|--|---|--|
|                                | N                 | P.O. | K.O |  |   |  |
| Corn                           | 100               | 60   | 60  | 6-24-24 @ 250 lb side band<br>85 lb N*   | (A) 8-32-16 @ 100 lb side band<br>90 lb N*<br>30 lb P.O. <sub>5</sub> plus<br>45 lb K.O<br>plowed down<br><b>OR</b><br>(B) 8-25-3 (liquid)<br>or 6-24-6 (dry)<br>@ 50 lb with<br>seed<br>95 lb N*<br>50 lb P.O. <sub>5</sub> plus<br>60 lb K.O<br>plowed down | 13-52-0 @ 120 lb side band<br>85 lb N*<br>60 lb K.O<br>plowed down   |
| Hay-Pasture<br>(mainly grass)  | 50                | 60   | 60  | 15-15-15 @ 400 lb broadcast in spring  | 0-20-20 @ 300 lb broadcast in fall or spring<br>50 lb N broadcast in spring   | 60 lb P.O. <sub>5</sub> plus<br>60 lb K.O<br>broadcast in fall or spring<br>50 lb N broadcast in spring        |
| Spring Grains                  | 40                | 50   | 50  | .  | 6-24-24 @ 200 lb drilled<br>30 lb N broadcast in spring and worked in   | 13-52-0 @ 100 lb drilled<br>50 lb K.O broadcast in fall or spring<br>30 lb N broadcast in spring and worked in |
| Spring Grains<br>(seeded down) | 15                | 60   | 180 | 8-32-16 @ 200 lb drilled<br>150 lb K.O broadcast in fall (after grain harvest) |   |  |

\* Nitrogen may be applied in the spring either as a preplant application (broadcast on the surface and worked in, plowed down, injected) or side-dressed.

Similar alternatives are possible for other crops not listed in the above examples.

## USE OF PESTICIDES

Different companies' brands of a pesticide often have different concentrations of the same chemical in them. Consequently, if you use one with a concentration different from that listed in the recommendations in this publication, you will need to adjust the rate of application so that you will be applying the same amount of actual chemical (active ingredient).

Calibrate your sprayer (Page 55) at least twice during the growing season. The wear on nozzle and other parts will alter the amount of spray delivered at the usual rate of speed and pressure.

## SAFETY OF OPERATOR

1. Read the safety precautions on the label before using any pesticide. Follow them. Understand the directions given before proceeding. If the label calls for the use of protective clothing or equipment, do not proceed without it.
2. When opening containers and filling the sprayer, avoid splashing or spilling. If it occurs, clean pesticide up promptly and burn any rags or papers used in soaking it up. Do not breathe the dust of dry pesticides. In case of a spill on the operator's person, remove clothing from affected area and wash at once.
3. Pesticides should be mixed or prepared in the open air or in a well-ventilated room. Measure the ingredients accurately and mix them thoroughly before applying. **Do not** smoke, eat, or drink while mixing or applying pesticides.
4. Do not work in spray drift, dust, or fumes. Avoid downwind spraying.
5. Wash contaminated clothing before wearing it again.
6. After applying an insecticide, the operator should bathe and change into clean clothing.
7. Treat all pesticides (insecticides, herbicides, fungicides) as highly poisonous substances and handle them with great caution.
8. Excess pesticide solution should be poured out in an isolated area where it will not contaminate crops or water, or injure domestic animals or wildlife.

## SEED TREATMENTS

Seed dressings or treatments are poisonous to man and livestock. Do not inhale the fumes or dust when treating or handling treated seed. Wash all residues of these chemicals from the skin after seed treatment is completed. Never feed surplus seed treated with chemical seed dressings. Bags which have held treated seed must not be used for foodstuffs or feed.

## PROTECT HONEYBEES

Because bees may be killed, do not apply insecticides on bee pastures or on wild plants that are in bloom. Carbaryl (Sevin) is extremely toxic to honeybees. If insect control is necessary while crops are in bloom and attractive to honeybees, spray only in the evening or in the early morning when bees are not in the field. Do not spray when the wind will carry the insecticide to adjacent bee pastures.

## PESTICIDE APPLICATION BY AIRPLANES

### OR HELICOPTERS

Applications should not be made if the wind is blowing. Some drift occurs even on the stillest day and to keep it to a minimum, apply pesticides in the evening or early morning. A special permit for aircraft application is required by the Ontario Department of Health, for most organo-phosphorus insecticides. Malathion, dimethoate, and diazinon are exempt, however. Be sure that the product to be used is registered for application by aircraft and specified along with rate of application in the contract. Carbaryl (Sevin) should not be applied by air because of drift to bee foraging areas.

## IN CASE OF ACCIDENT INVOLVING A PESTICIDE

If a pesticide is swallowed or if a person suddenly feels sick while using a pesticide, call a physician immediately. So that he will know what poison may be involved, give the physician a label from the container or the common or chemical names of the ingredients listed on the label, together with the suggested antidote, if any, and first aid treatment. Keep the telephone number of your own physician by the telephone.

Information regarding first aid and advice on treatment in cases of pesticide poisoning is available from Dr. E. Mastromatteo, Environmental Health Services Branch, Ontario Department of Health, 1 St. Clair Avenue West, Toronto 195, Ontario.

Telephone: area code 416; office 365-2401; home 485-9606.

## RESIDUES ON CROPS TO BE HARVESTED OR FED OR GRAZED

Certain pesticide residues disappear quickly after application; others persist in poisonous form for much longer periods. When crops with persistent residues are fed to livestock, the poisons tend to accumulate in the body fat and milking cows will excrete them, or their metabolic products, in the milk. Young calves, heifers, and dry cows will store these in body fat and secrete them when they freshen months later. Even the use of bedding from treated crop remnants is not recommended.

To avoid residue problems, use (1) the proper chemical, (2) the recommended dosage, and (3) observe the proper interval to harvest.

Never apply endosulfan (Thiodan), chlordane, endrin, BHC (lindane) to forage, hay or other feed that is to be fed to livestock. If hay, corn stover, pea vines, bean straw, etc, are to be purchased, check on the possibility of their having been sprayed. Apple pomace should not be fed because there are residues of insecticides present that may appear in the milk or body fat later.

When using other pesticides, do not apply a treatment closer to pasturing, feeding or harvest than the waiting period indicated below:

|   |   |         |                           |   |         |
|---|---|---------|---------------------------|---|---------|
| azinphos-methyl<br>(Guthion spray<br>concen.) | — | 3 days  | disulfoton<br>(Di-Syston) | — | 60 days |
| carbaryl (Sevin)                              | — | 1 day   | Imidan                    | — | 7 days  |
| carbofuran<br>(Furadan)                       | — | 14 days | malathion                 | — | 7 days  |
| chlordan                                      | — | 30 days | methoxychlor              | — | 7 days  |
| dimethoate (Cygon 4E,<br>Rogor 40)            | — | 30 days | parathion                 | — | 21 days |
|   |   |         | phorate                   | — | 60 days |
|   |   |         | (Thimet)                  | — |         |

## CONTAINER DISPOSAL

Empty pesticide containers usually contain harmful residues. Paper and cardboard containers should be burned (keep out of smoke) and the ashes buried under at least two feet of earth in an isolated place, where the residues cannot contaminate water supplies or crops, or injure domestic animals or wildlife. Metal or glass containers should be crushed or broken and buried as described above.

## PESTICIDE STORAGE

Pesticides should be stored in their original containers with labels in place — **never in food or beverage containers**. They should be kept in a dry place (wall cupboard, etc) which is kept locked when the products are not being used. Never leave open packages or tins of pesticides around while you are spraying elsewhere.

## RELATIVE TOXICITY OF SOME INSECTICIDES

The toxic (poisonous) level indicates the hazard of an insecticide to the user. It is expressed by an LD<sub>50</sub> value established for intake through the mouth (oral) and absorption through the skin (dermal). The **LOWER** the figure the **MORE** toxic the material.

|                  |           |
|------------------|-----------|
| Extremely toxic  | 0 to 20   |
| Highly toxic     | 20 to 50  |
| Moderately toxic | 50 to 500 |

Wear a respirator and rubber gloves when handling, mixing or applying all insecticides with an LD<sub>50</sub> less than 150.

| Chemical                        | Toxicity |        |
|---------------------------------|----------|--------|
|                                 | Oral     | Dermal |
| azinphos-methyl (Guthion)       | 16       | 220    |
| Bux                             | 80       | 400    |
| carbaryl (Sevin)                | 560      | 5,000  |
| carbofuran (Furadan)            | 11       | 6,000  |
| chlordan                        | 500      | 1,100  |
| dimethoate (Cygon 4E, Rogor 40) | 215      | 400    |
| disulfoton (Di-Syston)          | 6        | 20     |
| Dyfonate                        | 10       | 130    |
| Imidan                          | 230      | 3,000  |
| malathion                       | 1,280    | 4,500  |
| methoxychlor                    | 5,000    | 6,000  |
| parathion                       | 13       | 15     |
| phorate (Thimet)                | 4        | 5      |

**CAUTION:** Always check BOTH the oral and dermal figures to establish the toxicity.

## SPRAYERS

Weedicide sprayers, capable of delivering sufficient gallonage per acre for adequate coverage, are satisfactory for applying the emulsion-type of insecticide. However, if 2,4-D or related herbicides have been used in them, such sprayers will have to be cleaned thoroughly or foliage is apt to be damaged (See Publication 256, **Field Weed Sprayers**, Page 36). The detergent recommended should contain ammonia for best results.

For applying the wettable powder formulations, a high-gallonage (40 gallons per acre or more), high-pressure piston pump sprayer with an agitator, is recommended. Keep in mind that the higher the pressure, the greater the danger of drift to other crops.

## Determining the Sprayer Output per Acre (Sprayer Calibration)

Here is one method of calibration for both overall spraying and band spraying.

1. Set out two stakes 660 feet apart.
2. Pick a level spot and fill the sprayer tank with water. Operate the sprayer to be sure that the supply line up to the shut-off valve is full before finally filling the tank. RECORD THE WATER ON A MEASURING STICK.
3. Spray between stakes at a DEFINITE SPEED AND PUMP PRESSURE. Turn the boom on as the first stake is passed. The by-pass pressure relief valve must be set to give the desired pressure when the shut-off valve is open. MARK THE THROTTLE SETTING.
4. Return the sprayer to the same location as before the calibration run. Carefully measure the amount of water required to refill the tank to the same mark on the measuring stick.
5. Calculate the application rate in gallons per acre

$$\text{GPA} = \frac{\text{Gallons of water added} \times 66}{\text{Boom length (in feet)}}$$

**Sample calculation:** (1) Overall Sprayer. If the sprayer has a 25-foot-long boom and 12 gallons of water are required to refill the tank, the application rate is:

$$\text{GPA} = \frac{12 \times 66}{25} = 31.7 \text{ gal per acre.}$$

**Sample calculation:** (2) Band Spraying. If the sprayer has four nozzles and each nozzle covers a 14-inch band, the total width of the spray patterns (boom length) is:

$$4 \times \frac{14}{12} \text{ feet or } 4.7 \text{ feet.}$$

If two gallons of water are required to refill the tank, the application rate is:

$$\text{GPA} = \frac{2 \times 66}{4.7} = 28.1 \text{ gal per acre}$$

**NOTE:** When band spraying, the acreage actually sprayed is NOT the same as the crop acreage.

## Weights, Measures and Seeding Rates

### Liquid Measure

20 fluid oz = 1 pint

40 fluid oz = 2 pints = 1 quart

160 fluid oz = 8 pints = 1 imperial gallon

### Square Measure

144 sq ins = 1 sq ft

1,296 sq ins = 9 sq ft = 1 sq yd

39,204 sq ins =  $272\frac{1}{4}$  sq ft =  $30\frac{1}{4}$  sq yds = 1 sq rod

6,272,640 sq ins = 43,560 sq ft = 4,840 sq yds = 160 sq rods = 1 acre

### Seeding Rates and Weights Per Bushel

| Crop              | Weight<br>lb per<br>Bushel | Rate of Seeding<br>per acre                          | Crop                      | Weight<br>lb per<br>Bushel | Number<br>Seeds<br>per lb |
|-------------------|----------------------------|--|---------------------------|----------------------------|---------------------------|
| Wheat .....       | 60                         | 1½ bu  | Alfalfa .....             | 60                         | 200,000                   |
| Oats .....        | 34                         | 2 bu not seeded down;<br>1½ bu if seeded down        | Red Clover .....          | 60                         | 275,000                   |
| Barley .....      | 48                         | 2 bu   | Ladino .....              | 60                         | 800,000                   |
| Rye .....         | 56                         | Small-seeded variety<br>1½ bu;<br>large-seeded 2½ bu | White Dutch Clover .....  | 60                         | 800,000                   |
| Buckwheat .....   | 48                         | 1 bu   | Bird's-foot Trefoil ..... | 60                         | 425,000                   |
| Corn .....        | 56                         | 14 lb  | Sweet Clover .....        | 60                         | 260,000                   |
| Beans .....       | 60                         | Small 35 lb  | Alsike .....              | 60                         | 700,000                   |
| Soybeans .....    | 60                         | 45 to 70 lb in rows                                  | Timothy .....             | 48                         | 1,230,000                 |
| Peas .....        | 60                         | 1½ to 3 bu   | Orchard Grass .....       | 14                         | 654,000                   |
| Flax .....        | 56                         | 35 lb for seed                                       | Bromegrass .....          | 14                         | 136,000                   |
| Millet .....      | 48                         | 20 lb  | Meadow and Tall Fescue .. | 22                         | 230,000                   |
| Potatoes .....    | 60                         | 25 bu  | Perennial Rye Grass ..... | 20                         | 227,000                   |
| Turnips .....     | 50                         | ½ lb   | Reed Canary Grass .....   | 44                         | 533,000                   |
| Mangels .....     |                            | 5 lb   | Bluegrass .....           | 18                         | 2,177,000                 |
| Rape & Kale ..... | 50                         | 1½ lb in rows  | Sudan Grass .....         | 40                         | 55,000                    |

### ESTIMATING STORAGE CAPACITY OF FEED VOLUME

#### Small Grains

To calculate the approximate capacity of a bin in bushels from the measurements of the bin in feet:  
 Length x Width x Height x 0.8 = bu

Ear Corn in Crib  
 Length (ft) x Average Width x Average Depth x 0.4 = bu Shelled Corn.

#### Space Required to Store One Ton of Hay

|                                    | Cubic Feet<br>Per Ton |
|------------------------------------|-----------------------|
| Loose in shallow mows .....        | 500 to 575            |
| Loose in deep mows .....           | 400 to 450            |
| Baled loose .....                  | 250 to 300            |
| Baled tight .....                  | 150 to 200            |
| Chopped long-cut or shredded ..... | 250 to 365            |
| Chopped short-cut .....            | 250 to 300            |

### Corn Silage\* in Horizontal Silo

| Width in Feet |        | Depth<br>in<br>Feet | Length<br>in<br>Feet | Tons<br>Silage<br>in Silo | Tons Silage per<br>Running<br>Foot<br>in Silo |
|---------------|--------|---------------------|----------------------|---------------------------|---|
| Top           | Bottom |                     |                      |                           |   |
| 8             | 6      | 6                   | 22                   | 16                        | .7  |
| 10            | 7      | 8                   | 27                   | 32                        | 1.2   |
| 12            | 8      | 8                   | 45                   | 63                        | 1.4   |
| 13            | 9      | 8                   | 61                   | 95                        | 1.6   |
| 14            | 10     | 8                   | 75                   | 126                       | 1.6   |
| 15            | 11     | 8                   | 95                   | 158                       | 1.7   |
| 16            | 12     | 10                  | 97                   | 236                       | 2.4   |
| 17            | 12     | 10                  | 124                  | 315                       | 2.5   |

\* These estimates are based on 1 cu ft of corn silage weighing 35 to 50 lb. For grass silage, increase tonnage estimates by 15%.

### Volume of Tower Silos at Various Sizes

| Inside<br>Diameter<br>of Silo<br>(ft) | Volume of Silo     |                       |                       |                       |                       |
|---------------------------------------|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                                       | Per Ft of<br>Depth | Per 20 Ft of<br>Depth | Per 40 Ft of<br>Depth | Per 60 Ft of<br>Depth | Per 80 Ft of<br>Depth |
| (ft)                                  | (cu ft)            | (cu ft)               | (cu ft)               | (cu ft)               | (cu ft)               |
| 10                                    | 78.5               | 1,570                 | 3,140                 | .....                 | .....                 |
| 12                                    | 113.1              | 2,262                 | 4,524                 | 6,786                 | .....                 |
| 14                                    | 153.9              | 3,078                 | 6,156                 | 9,234                 | .....                 |
| 16                                    | 201.0              | 4,020                 | 9,040                 | 12,060                | .....                 |
| 18                                    | 254.5              | 5,090                 | 10,180                | 15,270                | .....                 |
| 20                                    | 314.2              | 6,284                 | 12,578                | 18,852                | .....                 |
| 22                                    | 379.9              | 7,598                 | 15,196                | 22,794                | .....                 |
| 24                                    | 452.2              | 9,044                 | 18,088                | 27,132                | .....                 |
| 26                                    | 530.7              | 10,614                | 21,228                | 31,842                | .....                 |
| 28                                    | 615.4              | 12,308                | 24,616                | 36,924                | .....                 |
| 30                                    | 706.5              | 14,130                | 28,260                | 42,390                | 56,520                |

### Approximate Silo Capacities — Whole Shelled Corn and Ground Ear Corn<sup>1</sup>

| Moisture<br>in Kernels (%)               | Weight to Yield<br>Standard Bushel <sup>(2)</sup><br>(lb) | Volume to Yield<br>Standard Bushel <sup>(3)</sup><br>(cu ft) | Silo Capacity Per Foot of Height (bu) <sup>(4)</sup> |     |     |     |     |     |
|--|---|--|--|-----|-----|-----|-----|-----|
|  |   |  | 12   | 14  | 16  | 18  | 20  | 24  |
| <b>Whole Shelled Corn <sup>(4)</sup></b> |   |  |  |     |     |     |     |     |
| 15.5                                     | 56.0  | 1.25   | 90   | 123 | 161 | 203 | 251 | 362 |
| 20.0                                     | 59.1  | 1.30   | 87   | 119 | 155 | 195 | 241 | 348 |
| 25.0                                     | 63.1  | 1.36   | 83   | 113 | 148 | 186 | 231 | 332 |
| 30.0                                     | 67.6  | 1.44   | 79   | 107 | 140 | 176 | 218 | 313 |
| <b>Ground Ear Corn</b>                   |   |  |  |     |     |     |     |     |
| 15.5                                     | 70.0  | 1.94   | 58   | 80  | 104 | 131 | 162 | 233 |
| 20.0                                     | 76.5  | 2.05   | 55   | 75  | 98  | 124 | 153 | 220 |
| 25.0                                     | 84.4  | 2.18   | 52   | 71  | 92  | 116 | 144 | 207 |
| 30.0                                     | 92.1  | 2.30   | 49   | 67  | 87  | 110 | 137 | 196 |
|  |   |  |  |     |     |     |     | 307 |

<sup>(1)</sup> This table of silo capacities was calculated on the basis of data supplied by V. W. Davis, in Publication AE-3997, University of Illinois, March 1964.

<sup>(2)</sup> For ground shelled corn, increase silo capacity per foot by 14%.

<sup>(3)</sup> Standard bushel = 1 bu shelled corn at 15.5% moisture. All amounts shown are equivalent to the standard bushel of shelled corn.

## SOILS AND CROPS BRANCH SPECIALISTS

### Field Crop Specialists

| Name                       | Address   | Telephone                |
|----------------------------|---|--------------------------|
| W. Napp                    | O.D.A.F., Essex                                       | 519-776-7361             |
| W. W. Parks                | R.C.A.T., Ridgertown                                  | 519-674-5456             |
| A. K. Brooks               | R.C.A.T., Ridgertown                                  | 519-674-5456             |
| H. C. Lang                 | O.D.A.F., Box 398, 478 Huron St., Stratford           | 519-271-0280             |
| M. C. Watson<br>(Tobacco)  | Research Station, Box 820, Delhi                      | 519-582-1950             |
| N. W. Sheidow<br>(Tobacco) | Research Station, Box 820, Delhi                      | 519-582-1950             |
| L. Frayne<br>(Field Crops) | Research Station, Box 820, Delhi                      | 519-582-1950             |
| G. H. Henry                | Soil Science Department, University of Guelph, Guelph | 519-824-4120<br>Ext 2454 |
| W. M. Hill                 | Crop Science Department, University of Guelph, Guelph | 519-824-4120<br>Ext 2513 |
| R. A. Upfold               | O.D.A.F., Box 1330, Walkerton                         | 519-881-3301             |
| C. Kingsbury               | O.D.A.F., Box 370, Alliston                           | 705-435-5521             |
| J. P. Fish                 | O.D.A.F., Newmarket Plaza, Newmarket                  | 416-895-4519             |
| H. C. Wright               | O.D.A.F., 322 Kent St. W., Lindsay                    | 705-324-6121             |
| D. Bielby                  | O.D.A.F., 322 Kent St. W., Lindsay                    | 705-324-6121             |
| W. E. Hurst                | O.D.A.F., Box 820, Brighton                           | 613-475-1630             |
| A. F. Welbanks             | O.D.A.F., Box 651, Kingston                           | 613-546-3697             |
| P. E. Beaudin              | Ontario Government Building, Box 279, Kemptville      | 613-258-3411             |
| J. Schleihauf<br>M. Lareau |   |                          |

### Seeds and Weeds Specialists

|               |   |                          |
|---------------|---|--------------------------|
| G. J. Smith   | O.D.A.F., Box 820, Brighton                           | 613-475-1630             |
| W. D. Taylor  | Crop Science Department, University of Guelph, Guelph | 519-824-4120<br>Ext 2513 |
| R. D. McLaren | Crop Science Department, University of Guelph, Guelph | 519-824-4120<br>Ext 2513 |

### Insect and Disease Specialist

|           |  |                          |
|-----------|--|--------------------------|
| K. Bereza | Zoology Department, University of Guelph, Guelph | 519-824-4120<br>Ext 2147 |
|-----------|--|--------------------------|

**County and District offices of the**  
**ONTARIO DEPARTMENT OF AGRICULTURE AND FOOD**

| County or District | Address   | Telephone |
|--------------------|---|-----------|
| ALGOMA             | 1496 Wellington St. E., Sault Ste Marie                   | 253-1941  |
| BRANT              | 207 Greenwich St., Brantford                              | 759-4190  |
| BRUCE              | Box 1330, Walkerton                                       | 881-3301  |
| CARLETON           | 26 Thorncliffe Place, Ottawa 6                            | 828-9167  |
| COCHRANE N.        | Experimental Farm, Kapuskasing                            | 335-5828  |
| COCHRANE S.        | Matheson  | 32        |
| DUFFERIN           | Box 100, Orangeville                                      | 941-3830  |
| DUNDAS             | Box 488, Winchester                                       | 744-2313  |
| DURHAM             | 14 Frank St., Bowmanville                                 | 623-3348  |
| ELGIN              | 594 Talbot St., St. Thomas                                | 631-4700  |
| ESSEX              | Essex   | 776-7361  |
| FRONTENAC          | Box 651, Kingston   | 546-3697  |
| GLENGARRY          | Box 579, Alexandria                                       | 525-1046  |
| GRENVILLE          | Box 70, Kemptville  | 258-3411  |
| GREY               | 181 Toronto St. South, Markdale                           | 986-2040  |
| HALDIMAND          | Cayuga  | 772-3381  |
| HALTON             | 181 Main St., Milton                                      | 878-9701  |
| HASTINGS           | Box 340, Stirling   | 395-3393  |
| HURON              | Box 159, Clinton  | 482-3428  |
| KENORA             | 70 Van Horne Ave., Dryden                                 | 223-2415  |
| KENT               | P.O. Box 726, 61½ King St. W., Chatham                    | 354-2150  |
| LAMBTON            | Box 730, Petrolia   | 882-0180  |
| LANARK             | Box 460, Perth  | 267-1063  |
| LEEDS              | Box 635, Brockville                                       | 342-2124  |
| LENNOX & ADD.      | Box 1600, Napanee   | 354-3371  |
| MANITOULIN         | Gore Bay  | 282-2043  |
| MIDDLESEX          | Room 109, County Bldg., 367 Ridout St. N., London 12      | 434-1613  |
| MUSKOKA & P.S.     | Box 130, Huntsville                                       | 789-5491  |
| NIAGARA N.         | Vineland Station  | 562-4142  |
| NIAGARA S.         | 574 South Pelham St., Welland                             | 732-7552  |
| NIPISSING          | 222 McIntyre St. W., North Bay                            | 474-3050  |
| NORFOLK            | 19 Kent St. S., Simcoe                                    | 426-0680  |
| NORTHUMBERLAND     | Box 820, Brighton   | 475-1630  |
| ONTARIO            | Box 309, Uxbridge   | 852-3132  |
| OXFORD             | Box 666, 954 Dundas St. E., Woodstock                     | 537-6621  |
| PEEL               | 3 Elizabeth St. S., Brampton                              | 451-5474  |
| PERTH              | Box 398, 478 Huron St., Stratford                         | 271-0280  |
| PETERBOROUGH       | 55 George St. N., Peterborough                            | 745-2403  |
| PREScott           | Box 110, Plantagenet                                      | 673-5111  |
| PRINCE EDWARD      | Box 470, Picton   | 476-3224  |
| RAINY RIVER        | Front St., Emo  | 482-2310  |
| RENFREW            | 315 Raglan St. S., Renfrew                                | 432-4841  |
| RUSSELL            | Box 280, Rockland   | 762-5106  |
| SIMCOE N.          | Box 340, Elmvale  | 306       |
| SIMCOE S.          | Box 370, Alliston   | 435-5521  |
| STORMONT           | Box 655, 109-11th St. W., Cornwall                        | 933-1581  |
| SUDBURY            | 1414 LaSalle Blvd., Sudbury                               | 566-1630  |
| TEMISKAMING        | Box "G", New Liskeard                                     | 647-6701  |
| THUNDER BAY        | Box 958, Postal Station P, 590 Memorial Ave., Thunder Bay | 345-1472  |
| VICTORIA           | 322 Kent St. W., Lindsay                                  | 324-6121  |
| WATERLOO           | 824 King St. W., Kitchener                                | 744-5294  |
| WELLINGTON         | Box 370, Arthur   | 848-2447  |
| WENTWORTH          | R.R. No. 1, Ancaster                                      | 527-1744  |
| YORK               | Suite 211 & 212, Newmarket Plaza, Newmarket               | 895-4519  |

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## 1971 FIELD CROP RECOMMENDATIONS

Information supplied under the direction of Ontario Committee on Field Crop Recommendations, composed of representatives of the following organizations:

ONTARIO AGRICULTURAL COLLEGE, UNIVERSITY OF GUELPH

ONTARIO DEPARTMENT OF AGRICULTURE AND FOOD

Colleges of Agricultural Technology:

Kemptville

New Liskeard

Ridgetown

Extension Branch

Soils and Crops Branch

CANADA DEPARTMENT OF AGRICULTURE

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ADVISORY FERTILIZER BOARD FOR ONTARIO

ONTARIO HERBICIDE COMMITTEE

**1971  
FIELD CROP  
RECOMMENDATIONS**